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# Worldwide Report

ENVIRONMENTAL QUALITY

No. 391

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# FIRST LADY SUBMITS ANTI-POLLUTION BILLS

Manila BULLETIN TODAY in English 15 Feb 83 pp 1, 12

[Text] The First Lady and Human Settlements Minister Imelda R. Marcos filed four bills with the Batasang Pambansa yesterday.

Co-authored by Assemblywoman and former Senator Helena Benitez (KBL, Southern Tagalog) and Assemblyman Gualberto Lumauig (KBL, Cagayan Valley), the bills seek to:

1. Establish a coastal zone management system to meet the country's socio-economic needs.
2. Provide for additional incentives for the installation and use of pollution control devices.
3. Exempt anti-pollution systems from real property tax.
4. Promote soil conservation management.

The bills were immediately referred on first reading to the committees on human settlements, on appropriations, on finance, and on agriculture.

On the first bill, the First Lady explained that the Philippines, an archipelago of 7,100 islands, has an extensive coastline of 34,600 kilometers, indented with bays, gulfs, and caves, with many beautiful and scenic areas.

She said that in some offshore places, oil wells have been established. While products of these oil wells provide the country with essential fuel, the spoilage and oil spills, thermal and other kinds of pollution resulting from the operations of oil wells would become dangerous hazards to ecology and humanity if not properly managed.

Mrs. Marcos said reclamation of lands along the shores should be consistent with the state's policy to rationalize and develop lands for the people's general welfare, and not only for the use or benefit of the affluent.

The management of coastlines is now fragmented and placed under different government agencies, she said. For a more systematic and effective

management of coastlines, she proposed to vest the power of supervision in a National Environmental Protection Council.

On the second bill, the First Lady said the acquisition of pollution control equipment and devices can be very expensive, thus the grant of tax incentives under the Philippine Environment Code.

To assure continuous encouragement for industries to take pollution preventive measures, the First Lady proposed to extend the period of availment of these incentives. She also proposed additional deduction of 50 per cent of expenses actually incurred on research projects.

The third bill, she explained, would be an effective way of encouraging project proponents to install anti-pollution equipment.

The fourth bill would fill the gap in the Soil Conservation Act.

CSO: 5000/4313

THAILAND

TOXIC CHEMICAL POISONING BLAMED ON IMPORT POLICY

Bangkok SIAM RAT in Thai 17 Jan 83 p 3

[Interview with Dr Prayun Dima, the Director of the Toxic Substances Control division, Department of Agriculture, Ministry of Agriculture and Cooperatives, by Chaturaphon Phumichai; date and place not specified]

[Text] [Question] What is your view on the use of toxic chemicals in our country?

[Answer] The matter of toxic substances is not a minor matter. These can affect people throughout the nation if not used carefully. Our country uses chemicals, which are toxic substances, incorrectly. In promoting sales, the private companies are very powerful, and it seems that the various sectors have not taken steps to control them or supervise them closely. Our unfortunate farmers use large quantities of insecticides and herbicides. Chemical fertilizers too are used in excessive amounts. It is true that agricultural yields have increased greatly. But the capital spent on improving the land and on purchasing fertilizer, insecticides and herbicides has increased greatly too. And even though yields have increased, it has not been possible to sell the produce. This valuable produce is not safe from excessive concentrations of toxic substances and so foreign countries cannot purchase the produce. It cannot be sold. The natural environment is deteriorating. Fish have come down with diseases and are dying. The investments that have been made have all been lost. We have even found traces of DDT in breastmilk since so much insecticide has been sprayed in accord with the advertisements. This substance has gotten into the water supply. In another 10-20 years, things will be worse than just having diseased fish. However, its good that senior people now know about this.

[Question] Why did the various problems arise?

[Answer] Because we have greatly promoted the new agricultural plan while neglecting to consider the harmful things that could occur. Do not think that things are safe around you. [I] would like to know how many government doctors in the provinces are aware that people have become sick from pesticides. How many people buy drugs to treat themselves,

and how many go to doctors? Who can argue that these chemicals are not a reason for the illnesses of the people?

[Question] What caused you to get involved in work concerning chemical substances and work in this field for 25 years?

[Answer] At that time I was a student at Kasetsat University. I was very poor and had to work too. One time, an international conference was held in Thailand on agricultural science. I helped the professors. They asked how Thailand used chemicals. We said that we used "dieldrin 1 percent." The foreigners were surprised that we would do this (and said that ) if we continued to do this, things would soon begin to die. That was the beginning for me, that is, in 1957. Now, we are using paraquat.

This work has not been very beneficial to me. I have not received many two-step promotions. Because this work hurts the profits of the big businessmen and multinational corporations. These people have access to the prime minister and to various ministers. It is dangerous for me to oppose them. But I pity the farmers, who have been tricked into using these chemicals. They have been given false information. Foreign countries stopped using some of these chemicals a long time ago, but they can sell them here. Our children will be born handicapped and deformed. I do not want future generations to say that we did not protect them even though we were aware of the problem.

I know that I have made many enemies by opposing them. If something happens to me, there is no one else except for those involved in this field.

11943

CSO: 5300/4311

## THAILAND

### SOIL QUALITY DECLINING ON 85 PERCENT OF LAND

Bangkok PHYA KHRUT in Thai 3 Jan 83 pp 1, 16

[Article: "Thailand Will Be a Desert: There Are 191 Million Rai of Land Which Produce Poor Yields"]

[Text] It has been revealed that 191 million rai of land in the country, or 85 percent of the land, is turning into a desert because of a lack of organic matter. The government has ordered the Department of Lands to take urgent steps to correct this before it reaches the stage where nothing can be grown.

A report from the Department of Land Development states that, at present, 191 million rai of land in Thailand, or 85 percent of the country's land, lacks organic matter. This results in the crops being unable to make beneficial use of the other elements such as food, water and weather. And this causes yields to decline.

Besides this, from surveys conducted by the Department of Land Development, it has been learned that the poor quality of most of the soil in Thailand is the result of the fact that Thailand is located in a tropical climate. The minerals in the soil are washed out by the heavy rain. This results in the top soil and organic matter being destroyed. This usually occurs in areas where the land is very steep.

This washed out soil is blown away and deposited as sediment in the rivers, which makes the rivers shallow and causes the soil to lose its natural fertility. There are about 107 million rai of such land, or 33 percent of the country's land area.

The report states that these problems can be prevented by using various soil and water conservation measures such as terracing the land and building dikes in order to prevent water runoff in steep areas. In areas where the land is not too steep, rows of vegetation can be planted transversely. Besides this, concerning improving soil that lacks organic matter, we can use waste matter from the fields such as dead plants and animal manure to make compost. Or we can grow vegetation and then plow it under in order to make fertilizer from live plants.

Another land problem is that wrong types of land are used and land is not used economically. The suitability of the land is not considered, which results in people obtaining lower yields than they should. Farmers in general have tried to increase their yields by expanding the area under cultivation. They have done this by invading the forest reserves and headwater areas. They have invaded 30 million rai in order to expand the crop growing area, and this has given rise to various problems such as soil degeneration, drought and flooding. This is because the soil does not have any permanent vegetation covering as before. When it rains, the top soil erodes. Thus, the fertile layer of topsoil is carried to lower levels and piles up like sediment in the rivers and canals.

The report also said that the natural condition of the land is a problem too. For example, there is acidic soil in the central region, salty soil in the northeast, and "phru" and old mine soil in the south.

In order to solve these problems, the government has entrusted the Department of Land Development, which is the unit responsible for land development, with the task of formulating a land use policy and plan in accord with the Fifth National Economic and Social Development Plan (1982-1986) in order to correct the farmers' incorrect use of the land. Surveys must be made, data must be gathered on the land, soil samples must be analyzed, the status of the private property must be determined and data must be collected on soil types and land use conditions and on economic and social conditions. Also, data on land use laws must be collected and various other data must be collected, such as on water supplies, environmental conditions, resources and minerals, communications, markets and so on. This must be done in order to make estimates and analyses and formulate land use policies and plans that can be used to draft a land development act that the state can implement. In doing this, consideration must be given to gaining the greatest benefits possible from using the land and to having things be in accord with the production capabilities of the land.

11943

CSO: 630 4311



## THAILAND

### TOXIC CHEMICAL IMPORTS, CONCENTRATION IN FISH REPORTED

Bangkok SIAM RAT in Thai 21 Jan 83 p 7

[Article by Dr Sitthi Bunyarattaphlin, a Scientist With the Fresh-Water Fisheries Institute, Department of Fisheries, Ministry of Agriculture and Cooperatives: "The Effect of Toxic Substances On Producing Aquatic Products"]

[Text] Concerning expanding the rearing of breeder fish and releasing them to propagate in the natural water sources and in the various water supply projects so that these fish become a source of protein, particularly in the poor rural areas, training farmers to raise fish in their fields, and raising and finding types of fish that sell for a high price in order to help the farmers switch to this as their main occupation and in order to quickly disperse fishery production, these things will probably all fail to achieve results if things continue as they are today with regard to protecting the water sources from pollution, which may kill the aquatic animals.

The pollution in the water sources stems from various things. There are both direct and indirect causes that are both intentional and unintentional. The things that are the most worrisome and most dangerous are the toxic substances from industry and agriculture. It is true that these toxic substances benefit agriculture by killing plant pests, but unless there are good measures, there will be harmful effects too.

Besides the danger they pose to humans and other animals, toxic substances are important elements in poisoning the water and making it unfit for aquatic animals. Most people have probably not considered the damage that this will cause.

In Thailand, there are at least 100 toxic substances that are used in agriculture and there are at least 1,000 different formulas. These can be divided into four groups based on how long they survive in nature. First are the nonpersistent substances, which includes organophosphorus compounds such as malathion and parathion. These substances have a residual effect that lasts from 1 to 12 weeks. Furthermore, carbamate compounds such as sevin and methomyl are included in this group too. Second are

those substances that break up relatively quickly. These include the 2,4D group and atrazine. These substances have a residual effect that lasts from 1 to 18 months. Third are the substances that break up very slowly. This is the chlorinated hydrocarbon group, which includes DDT, asdrin, dieldrin, endrin, cholrdane and heptachlor. The residual effect of these substances lasts from 2 to 5 years. The fourth group is the permanent group. This includes mercury, lead and arsenic. These substances do not get washed elsewhere because they do not dissolve in water.

The amount of toxic chemicals imported into Thailand has increased continually, from 5,991 tons in 1971 to 19,914 tons in 1980 (see Table 1). There are many problems in using toxic chemicals in agriculture because the toxic substances that most [people] like to use are those in the chlorinated hydrocarbon group, which do not dissolve easily, especially when they get into humans, animals and plants.

Toxic substances are present in the air, in the soil and in the water. Toxic chemicals get into the air from aerial pesticide spraying, which is a popular method. This is commonly done on large areas since it saves time. But if precautions are not taken concerning both types and amounts of pesticides, this can endanger other living things both on land and in the water. The same is true for the use of toxic chemicals in agriculture and for household use. Their popularity is now spreading. Toxic chemicals now have a greater chance to ruin the land, and larger and larger quantities are getting into the soil since plants can absorb the toxic chemicals left in the soil. In the end, water, which can wash the toxic chemicals into the rivers and canals, is the agent that spreads the toxic chemicals into the water sources where aquatic animals live.

Aquatic animals are influenced by the toxic chemicals that are washed into the water sources in various ways. But once they are affected by the toxic chemicals, these animals cannot complain, except by showing symptoms caused by the toxic chemicals. These effects are manifested in two ways: the aquatic animals die immediately after ingesting the toxic chemicals, or they gradually accumulate these substances in their bodies until they reach their limit and begin to weaken. Their resistance to disease is lowered and bacteria in the water kill them. These diseases spread, and more and more aquatic animals die.

Since 1980, the Toxic Chemicals Research Section, Department of Agriculture, has conducted tests to determine the concentration of toxic chemicals in the Chao Phraya, Bang Pakong, Mae Klong and Tha Chin rivers, the mouth of the Gulf of Thailand and the Damnoen Saduak Canal. It has found DDT, asdrin, endrin, dieldrin and heptachlor. In particular, concentrations of DDT and dieldrin ranged from 1.53 to 4.62 ppb. As for the tests for toxic chemicals in sediment, DDT was found in almost every sample. The highest concentration of DDT found was 0.12 ppm.

Data from the Toxic Chemicals Research Section show the same thing for the period 1976 to 1978. The concentration of toxic chemicals in various aquatic animals such as shrimp, oysters, crabs and fish increased continually. Most of these substances were in the group whose effect lasts 2 to 5 years, that is DDT, dieldrin and endrin. In 1978, DDT and other chemicals from the same group were found in *Notopterus* fish in concentrations as high as 1.324 ppm. Dieldrin was found in *Sinotaia bengalensis* oysters in concentrations as high as 0.28 ppm. DDT and other chemicals in this group were found in about half the samples of aquatic animals in concentrations exceeding 0.1 ppm.

In small living organisms that fish feed on, that is, zooplankton and algae, in the Chao Phraya, Tha Chin, Mae Klong and Bang Pakong rivers and the mouth of the Gulf of Thailand, asdrin was found in concentrations of 0.01 to 0.040 ppm, DDT was found in concentrations of 0.05 to 0.46 ppm, dieldrin was found in concentrations of 0.15 to 1.37 ppm and endrin was found in concentrations of 0.01 to 0.28 ppm. This was in 1979-1980.

Based on the data that has been presented, it can be seen that toxic chemicals are widespread. They are present in the water, which is where aquatic animals live, in the sediment in the river beds and even in the natural food in the water, that is, the zooplankton and algae. These toxic chemicals have definitely accumulated in the aquatic animals, which poses a danger to the aquatic animals and to those who eat aquatic animals.

The concentration of toxic chemicals in the water, sediment, small natural foods such as zooplankton and algae and aquatic animals is gradually increasing. This is because the accumulation of toxic chemicals in the aquatic animals increases the longer the aquatic animals are in contact with the toxic chemicals. From the tests concerning the immediate and long-term effects of dieldrin on *Peocilia latipinna* fish, it was learned that the fish will die within 1 week if the concentration reaches 0.012 ppm. If the level is between 0.00075 and 0.0015 ppm, the fish can survive up to 34 weeks, with less than 50 percent dying. When the fish that had survived were examined, it was found that the various organs of the fish contained different amounts of the toxic chemical (see Table 2). The concentration of dieldrin in the various organs of the fish was several times higher than that in the water.

From tests conducted with other types of fish, it was found that DDT in concentrations from 0.25 to 0.75 ppm will cause "nai" fish to die within 7 days. As for the toxicity of dieldrin with respect to "nai" fish, gourami and catfish, [see] Table 3.

The concentration of a toxic chemical that will kill aquatic animals depends on the type of aquatic animal, the type of toxic chemical and the quality of the water.

Thus, it is essential that the government sectors concerned take quick action to care for the environments of the fishing sources in order to keep these environments as suitable places for aquatic animals to live and propagate. This must be done by stipulating measures to protect the environment and reduce the amount of toxic substances in the water sources so that they are safe for aquatic animals to live in. This must be done so that piscicultural production increases in accord with the targets.

Table 1: Amounts of toxic chemicals imported into Thailand from 1971 to 1980

Year imported	Amount	Cost (baht)
1971	5,991	141,723,000
1972	8,100	142,947,000
1973	8,524	158,858,000
1974	9,977	295,903,000
1975	8,213	316,858,000
1976	11,538	505,369,000
1977	15,623	664,722,000
1978	19,594	877,231,000
1979	19,840	1,051,092,000
1980	19,914	1,225,696,000

Table 2: Concentration of dieldrin (ppm) in various parts of the fish after having raised the fish for 34 weeks in water containing 0.00075 ppm to 0.0015 ppm of dieldrin

Part	Concentration of dieldrin	
	0.00075 ppm	0.0015 ppm
Blood	11.98	17.50
Liver	8.81	15.80
Brain	13.30	24.40
Viscera	9.60	22.00
Muscles	2.90	7.30
Gills	37.60	54.60

Table 3: Concentrations of dieldrin and the time it takes to kill the fish

Concentration of dieldrin (ppm)	Type of fish	Time taken to kill fish (hours)
0.005	Catfish	24-36
0.01	Nai fish	3-18
	Catfish	12-24
0.05	Nai fish	9-24
	Gourami	9-12
0.10	Nai fish	9-24
	Gourami	6-9
0.15	Nai fish	3-18
	Gourami	3-6
0.20	Nai fish	3-18
	Gourami	3-6
0.25	Nai fish	3-18
	Gourami	3 hours

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## THAILAND

### PROBLEMS WITH, POSSIBLE USES FOR WATER HYACINTH DISCUSSED

Bangkok SIAM RAT SAPPADA WICHAN in Thai 28 Jan 83 pp 18-23

[Article: "Water Hyacinth, a Headache For the Ministry of Interior"]

[Text] The epidemic among fish gave rise to various investigations of the causes, and in the end it was concluded that the disease is caused by pesticides, which when used, do not dissolve but rather become transformed into "pollutants" in the water. They lower the resistance of the fish to disease, and the fish easily fall victim to one type of bacteria, whose symptoms can be compared to those of a person with leprosy. The bodies of the fish are covered with holes and the flesh is red. Their appearance is very repulsive.

Concerning the investigation of the origins of the use of pesticides to the point where they have endangered the environment, besides the charge that farmers have been induced to use these toxic chemicals by companies that advertise and sell toxic chemicals, particularly the stump and grass killing chemical "paraquat," it has been charged that, recently, the Ministry of Agriculture and Cooperatives made a great effort to kill the water hyacinth using this type of chemical. However, this has not been confirmed.

Another government unit against which similar charges have been leveled is the Ministry of Interior, which has plans to eradicate water hyacinth on a national scale. It has been charged with purchasing 300 million baht worth of "paraquat" to kill the water hyacinth. But speaking on behalf of the Ministry of Interior, Mr Phisan Munlasatsathon, the under-secretary of the ministry of interior, has denied this charge. He has said that to eliminate the water hyacinth, the ministry's policy is to use manpower and equipment. "We have never considered using herbicides and chemicals to destroy [the water hyacinth].

Because water hyacinth has become an issue and has the nature of a political dispute that has aroused people's interest, [people] would like to know how severe a problem water hyacinth has become, whether it is a major problem or just a minor problem, and what will be done about the problem.

## Water Hyacinth

Water hyacinth, or "java" as it is called for short, has been a chronic economic problem in the country for a long time. It became a problem only a few years after it was first brought into the country from Indonesia. At present, there are only eight provinces where water hyacinth has not spread to. All the other 64 provinces have a problem with water hyacinth.

The villagers who live along the Chao Phraya River refer to water hyacinth as "java weed." The aquatic weeds work coordinating subcommittee of the Office of the National Research Council has classified it as an "aquatic weed" and has advised the units of the Ministry of Interior to be careful about granting permission to import this plant into the country or bring it into various localities. The common name of the plant is water hyacinth; its scientific name is *Eichhornia Crassipes* solms. It is a member of the Pontederiaceae family. It is a perennial plant.

Concerning the general appearance of the water hyacinth, according to Mrs Chuthip Chanaseni, an agricultural specialist, Level 6, with the Soil and Fertilizer Section, Crop Promotion Division, Department of Agricultural Extension, Ministry of Agriculture and Cooperatives, who has compiled [information] for SIAM RAT SAPPADA WICHAN, water hyacinth plants have only one flower cluster. The base of the cluster is heart shaped. It is supported and held above the water by a stem, which improves the flower's light synthesizing capability since the rows of petals are arranged in a good shape. Taken as a whole, the plant is very beautiful. It is thought that it was the beauty of the plant and the neat appearance of the flowers that caused leaders from Indonesia to import it into the country.

Water hyacinth is characterized by a cluster of small flowers. Each flower is yellowish blue and does not have a stem. Each flower is composed of six petals. Before the flowers bloom, they are sheathed in a bract. When the flowers emerge, they bloom immediately. Pollination takes place in only 1 day. Pollination takes place as in other flowers, that is, by means of insects or the wind or self-pollination occurs naturally. Once pollination has occurred, the stems gradually bend downward toward the water, which causes the sacs to fall off the stem. Inside these sacs are many seeds. Some get buried in the ground while others are carried away by the river. When the sac bursts, water hyacinth seeds are scattered.

Water hyacinth has branch roots that are submerged below the water. There is no down on the lower part of the roots. But some very old roots may have down. The root system of water hyacinth is very adept at taking in various foods to nourish the plants.



Water hyacinth propagates very quickly, blossoming miraculously. It can propagate in two ways:

1. It may give off shoots, or breed, without being fertilized. Instead it relies on stolon that erupt from the mother stalk. These produce many shoots. In 1974, the Applied Scientific Research Institute of Thailand conducted a study and found that 10 water hyacinth plants can produce 600,000 stolon in just 6 months.

Another report from the National Research Council, issued in 1977, stated that just two water hyacinth plants had been able to produce 300 stolon in just 20 days.

2. The plants may be propagated by seeds, or through fertilization. When the seeds that have been produced from pollination break out of the sac, they are spread about by the water current, they sink into the mud at the bottom of the river or they are carried away by animals such as birds to other places and so they are spread about very rapidly. One water hyacinth plant produces about 5,000 seeds, and it will bear flowers when it is just 26 days old. It can be fertilized in just 1 day, as was mentioned above. Thus, this plant propagates very quickly.

#### History of Water Hyacinth

Ever since 1913, Thais have seen the ill that comes along with the beauty of the water hyacinth. In that year, King Rama VI "remarked that there was a plant, which is known in this country as "top java" [water hyacinth] because it was brought from Java in 1901, that is very dangerous because it propagates very quickly. Wherever it is planted, it soon covers the area to the extent that farming is adversely affected. Also, it poses a danger for raising aquatic animals, and it makes boat travel in the rivers and canals difficult. In localities where this plant is growing, local administrative officials have for many years been trying to eradicate it to no avail. This is because some ignorant people have planted water hyacinth in various places to use it as grass to raise fish, mistakenly thinking that since it grows quickly it can meet their needs. Because this is easy to obtain, people who transport shrimp and fish by train and boat to sell these items in other cities use water hyacinth to cover their baskets and keep the sun off [their products]. Some people are not aware of the bad effects of water hyacinth; they think that it is just a beautiful plant that is easy to grow. They plant it for its beauty. Thus, water hyacinth has spread to the waterways in the north and has propagated in all the creeks and streams. Spreading to the rivers, it has obstructed the waterways more and more. If it is ignored too long, it becomes a danger and things become more and more difficult because of this plant...."



The 1913 act on eradicating water hyacinth provides a good background on the origin and dangers of water hyacinth. It continued:

"The king was greatly worried about this and so he ordered the minister of communications to serve as chairman and, together with the minister of interior and the minister of the municipality, to discuss this matter at the 19th annual municipal meeting in 1913. At this conference, it was decided to inform the king that there must be a royal act forbidding people from planting water hyacinth anywhere and that wherever water hyacinth was growing, the people there would have to be responsible for destroying it. But concerning the eradication of water hyacinth during this first stage, much water hyacinth was growing in the provincial areas along the lower reaches of the Chao Phraya, Tha Cin, Mae Klong and Bang Pakong rivers. It was beyond the power of the people to eradicate it by themselves. Unlike in the remote rural areas where there was little water hyacinth, concerning the eradication of water hyacinth in the inner provincial administrative circles, as mentioned, this required that government forces be used to help eradicate the water hyacinth first to slow down the propagation of the water hyacinth. Then, the people could complete the work. Thus, the same royal act had to be in effect everywhere. The king felt that the recommendations of the municipal conference were sound and so he ordered that the royal act be implemented...."

The 1913 act to eradicate water hyacinth is still in effect today. The penalties for disobeying the act are recorded in Article 7:

"Article 7: Whoever takes water hyacinth into an area where this act is in effect, whoever plants or raises water hyacinth or allows it to grow in prohibited areas and whoever disposes of water hyacinth in the rivers and canals is guilty of a minor offense. For the first offense, the penalty is a fine of up to 100 baht, imprisonment of up to 1 month or both."

The officials who were responsible for enforcing this act were the "minister of communications, the minister of interior and the minister of municipalities."

Then on 24 February that same year, King Rama VI forbid people from transporting water hyacinth by train, and on 1 April that year, there was a royal announcement implementing the Water Hyacinth Eradication Act in monthon [administrative circle] Phayap, Udorn, Nakhon Ratchasima, Phetchabun, Chanthaburi, Pattani, Nakhon Sithammarat and Chumphon, Muang [municipality] Pramburi, Phetchaburi, Kanchannaburi, Ratchaburi, Kamphaengphet and Tak, monthon Nakhon Sawan, muang Phichai, monthon Phitsanulok, muang Drapinburi and monthon Prachin.

On 28 December 1916, there was a royal order that this act be put into effect in Monthon Nakhon Chaisi and Monthon Krung Kao.

On 26 January 1917, there was a royal order that this act be put into effect in Prachinburi and Chonburi provinces.

On 15 October that same year, the act was put into effect in Uthaithani Province.

On 10 May 1918, the act was put into effect in Nakhon Sawan and Chainat provinces.

On 19 September 1920, the act was put into effect in Monthon Bangkok and in Ratchaburi, Samut Songkhram, Chachoengsao, Nakhon Nayok, Phitsanulok, Sawankalok, Sukhothai and Phichit provinces.

It can be seen that only 12 years after water hyacinth was first introduced into Thailand, its ill effects had spread like this, and it was necessary to initiate a massive eradication campaign. However, water hyacinth has not been eradicated yet, and now, 82 years later, it is threatening 64 provinces.

#### Sources and Dangers

According to the document "The Use of Neochetina Eichhorniae Warner to control Water Hyacinth Using Biological Methods In Thailand," which was written by Mr Wiwat Suasaat, Mr Koson Charoensom and Mr Banphot Na Pmophet, who are with the National Research Center for the Biological Control of Crop Pests, Kasetsat University, there is one section that says that it is thought that water hyacinth originally came from South America, perhaps from Brazil. It is a beautiful plant and so it was taken and grown in other countries. But it has become a problem that has had economic effects.

Concerning the losses or ill effects caused by water hyacinth, in its remarks on the 1977 program to control and eradicate water hyacinth throughout the country, the Ministry of Interior said that in a single year, water hyacinth causes economic and social losses totalling hundreds of millions of baht.

Such losses, as compiled by Mrs Chuthip Chanaseni, include:

##### 1. Agricultural Losses

Water hyacinth that invades rice fields crowds and squeezes the rice plants to the point where the rice plants break. It also keeps out the sunlight and uses the nutrients and water needed by the rice. It also provides shelter for rice pests such as rats, diseases and insects.

##### 2. Piscicultural Losses:

Water hyacinth greatly impedes the growth of aquatic animals. The high density of the plants, which grow in tight clusters, reduces the amount

of sunlight in the water, and this in turn reduces the amount of phytoplankton. The water sources quickly become clogged and this makes it difficult to drain the water and catch the aquatic animals.

### 3. Irrigation Losses

[Water hyacinth] obstructs the waterways, decreases the depth of the water, makes draining the water difficult and clogs up the drainage pipes, all of which was in the news throughout the country last year. Besides this, it also hinders power production from water power.

### 4. The Public Health Front

Water hyacinth produces shelter for harmful bacteria and mosquitoes and it is a breeding ground for mosquitoes.

### 5. The Economic and Social Front

The losses on the four fronts mentioned above have forced the state to have to spend hundreds of millions of baht a year on eradication, which is money that could have been spent on other economic and social development projects.

### Uses

Water hyacinth has both beneficial and harmful aspects, just like everything else in the world. Because of this, solving the water hyacinth problem can be done in one of two ways: making beneficial use of the water hyacinth or eradicating it.

From what can be seen, the beneficial uses of water hyacinth include:

#### 1. Using it to feed animals.

Based on analyses of the nutrients contained in water hyacinth, it has been learned that if this plant is dried, it contains 0.97-2.57 percent nitrogen, 5.0 percent potassium, 0.36 percent phosphorus, 3-4 percent chlorine, 3.5 percent calcium and 0-0.96 percent magnesium as compared with 34.25 pounds of flour. The amount of nitrogen in water hyacinth is similar to that found in various animal feeds such as "kini" and "nebia" grass. But it contains larger amounts of calcium and magnesium. It contains less phosphorus than these feeds.

In China, water hyacinth is cut into small pieces and boiled with other vegetables, rice bran, coconut meal and salt in order to feed hogs, ducks and fish. In Malaysia, fish meal is added too.

## 2. Using it to produce biogas:

By composting water hyacinth with animal dung in the ratio 1 part dung to 4 parts water hyacinth or using only water hyacinth by shredding it finely, it can be used to produce biogas just like dung. The ratio of carbon to nitrogen in water hyacinth ranges from 20 to 1 (if the plants are young) to 70 to 1 (if the plants are old). Thus, when composting water hyacinth, it is better to use young plants rather than older plants. Or if the plants are not shredded or ground, the entire stalk can be used whole. But larger pits must be built than the pits used for composting and about five times more dung (must be used) to produce the same amount of biogas. Data from the U.S. Space Agency shows that 1 kilogram of water hyacinth can produce 370 liters of gas, 69 percent of which is methane.

## 3. Using it to produce composted fertilizer:

If water hyacinth is taken from the rivers and left to dry for about 7 days and then piled up to form compost piles like other piles made from other waste plants, with enzymes either used or not used to speed up the decomposition, composted fertilizer can be obtained in about 30 days.

Tests conducted by the Department of Land Development show that if fertilizer is made by composting water hyacinth using various types of enzymes such as dung chemical fertilizer or lime, the decomposition of the water hyacinth will proceed more quickly than if enzymes are not used. Once the plants have decomposed into fertilizer, the amount and weight of the composted fertilizer is only about 25 and 30 percent of the original amount and weight respectively.

## 4. Using it as material to grow straw mushrooms:

Water hyacinth that is dried and then shredded finely can be used as a food supplement in growing straw mushrooms in rice straw. Or water hyacinth can be used as the waste plant to raise straw mushrooms instead of rice straw. It must be dried thoroughly in order to kill any bacteria or fungus. Then, the day that the straw mushrooms are to be cultivated, the dried water hyacinth must be soaked in water for about 1-2 hours and then piled up in layers as suggested. A standard-size wooden box about 14-16 inches wide, 1.2 meters long and 12 inches high can hold about four to five layers. Mushroom fungi is spread around the edges. It is then covered with a plastic covering. Then in about 2-3 weeks, the straw mushrooms will mature, which can be put to good use.

## 5. Using it to treat polluted water:

Water hyacinth can eliminate 75 to 80 percent of the polluted water. As for water that is polluted by industrial factories, water hyacinth

can remove about all of these pollutants from the water, particularly very toxic metals such as lead, mercury, nickel, cadmium, cobalt, silver and copper.

6. It can be used to make various goods. For example, the stalks of the water hyacinth can be dried and made into string and used to make purses, hammocks and chairs.

#### Eradication Through Making Beneficial Use [of the Plants]

As mentioned above, there are two trains of thought on this matter. One is to eradicate the water hyacinth completely since it is felt that its bad aspects outweigh its good aspects. The second is to put it to good use. For example, Mr Yukati Sarikaphum, the director-general of the Department of Agriculture, Ministry of Agriculture and Cooperatives, said in an interview several days ago that water hyacinth contains various nutrients. Besides the fact that it can be used to make animal feed, it can be used to make fertilizer -- and fertilizer can be made faster from water hyacinth than it can be from other materials -- and this can be used to replace stable manure without having to add any chemical fertilizers or stable manure.

Another unit of the Ministry of Agriculture and Cooperatives that is trying to eliminate water hyacinth by making beneficial use of it is the Department of Agricultural Extension. Mrs Chuthip Chanaseni said that the Department of Agricultural Extension has recommended the following projects:

1. The goal of the project to encourage the production and use of composted fertilizer is to have the farmers use waste materials and waste plants that are not being put to good use. They can be composted with dung and chemical fertilizers in order to make fertilizer and use it in growing various crops, particularly in areas where vegetables and fruit trees are raised. In 1983, this will be done on 4,100 fields (or 4,100 piles) in 52 provinces at a cost of 820,000 baht. The farmers will use various types of waste plants depending on the local conditions. For example, they can use rice straw, leaves, grass and water hyacinth. At present, the emphasis is on having various provinces make greater use of water hyacinth in producing composted fertilizer.

2. The goal of the project to encourage the production of biogas is to have the farmers compost waste materials and dung in an airless environment to produce methane, which can be used in cooking and for light. The waste matter that is left over can be used as good-quality fertilizer. Second, this will teach the farmers how to make gas pits and put them to good use. In 1983, 200 pits will be constructed in 23 provinces at a cost of 300,000 baht.

## Producing Alcohol From Water Hyacinth

Besides the eradication program to make use of [water hyacinth] in the agricultural sector, some have thought about using water hyacinth to produce alcohol in order to solve the energy problem in the future. This is also in accord with the Fifth National Economic and Social Development Plan. One objective in the plan is to develop various types of energy, accelerate energy conservation and promote the use of energy that will help reduce pollution.

The innovator who wants to use water hyacinth to produce alcohol is Dr Aram Buranasiri, the former deputy undersecretary of the Ministry of Industry and the chairman of the committee that is considering the production of alcohol from agricultural waste materials. Concerning the possibility of producing alcohol from agricultural waste materials, the following points should be considered:

1. There must be a stable and adequate supply of raw materials.
2. Transporting the materials to the plants must be convenient and inexpensive.
3. The raw materials must be inexpensive.
4. There must not be competition for raw materials that are used as food.
5. It must be possible to expand the sources of the raw materials.
6. It must be possible to increase the use of machinery and equipment if it becomes necessary to increase the quantity of raw materials supplied to the plants.
7. The raw materials must be types of materials that can be stored for long periods without losing their quality.
8. In production, as little energy as possible must be consumed.

Considering all these factors, Dr Aram Buranasiri feels that water hyacinth is the most suitable material for use in producing alcohol. Besides the fact that it has caused economic and social losses, it also satisfies the requirements mentioned above.

Dr Aram, who recently returned from a trip to observe operations and study the production of energy from waste materials in the United States and the use of alcohol in engines in Brazil, talked about the results of his studies. He said that he had learned that:



1. Economically, water hyacinth is very suitable for use as a raw material for supply to the alcohol plants because it is a waste plant of no value and there are such large quantities that a way must be found to eradicate it.
2. It can be used to replace fuel that has to be imported. This will save foreign currency and [help] solve the balance of trade problem.
3. This will enable people in the country to obtain jobs in the production plants and in related factories.
4. Besides eradicating the water hyacinth, the exhaust from engines that use alcohol produced from this type of waste plant will not pollute the atmosphere with lead.
5. This will [help] accumulate energy reserves in storehouses. It will then be possible to use these reserves immediately whenever necessary. And it will not go bad and cause pollution if it is preserved.
6. This is in accord with the situation in the country since the production plants will be small plants that are scattered around the places where water hyacinth grows. It will not require much capital to build a plant.
7. Based on technological studies, it has been found that this is suitable because this is easy for Thais, who are already familiar with similar methods in producing sugar from sugarcane and alcohol from molasses. Besides this, this will lead to the construction of yeast and cellulose plants and more enzymes will be produced, which will generate more jobs.
8. From the studies, it has been learned that there will not be problems in using alcohol in gasoline engines if the ratio of alcohol in the mixture does not exceed 20 percent.
9. It is easy to modify engines since only minor modifications have to be made. An alcohol tank has to be installed, and the inlet pipe has to be adjusted or changed to bring alcohol into the carburetor (where alcohol and air are mixed). The inside of the inlet pipe must be coated with nickel or tin, which will help prevent wear and rust from the use of alcohol.

Dr Aram also said that alcohol can be produced from water hyacinth using various processes as shown in the chart [at the end of the article].

Concerning the chart of a prototypal plant, which will have the capacity to produce 3,000 liters of ethyl alcohol, the process begins with water hyacinth being taken from the rivers and left on the banks until it is fairly dry. The protein is then extracted using caustic soda. Then, it is put in a filter press to remove the liquid, composed of a high PH solution, and the protein. The solution is then neutralized with

sulfuric acid. Once the liquid has been neutralized, it is put in a filter press to remove the waste water from the dissolved matter. What remains is a wet cake of protein. After it is dried in a dryer, animal feed rich in protein is obtained. This is a by-product.

As for the cellulose and hemicellulose remaining in the wet cake, there is still approximately 30 percent water. After it is separated from the protein alkaline solution, it undergoes a process in which this matter dissolves through a chemical reaction known as enzyme hydrolysis. Matter containing a cellulose enzyme is added to produce a reaction. What is obtained is glucose, which comes from cellulose, and xylyne, which is obtained from hemicellulose. When this is run through the fermentation process using yeast, alcohol is obtained, which can then be distilled to obtain alcohol of the desired strength.

Dr Aram Buranasiri said that it will require an investment of approximately 2 million baht to build a plant with this capacity. However, this project is just in the beginning stage. It must be approved and promoted by the units responsible in order, that is, the Ministry of Interior, the cabinet and finally the people.

#### Eradication Using Natural Methods

A very interesting method of eradicating water hyacinth that is now being tested is the biological eradication program of the National Research Center for the Eradication of Plant Pests Using Biological Methods, Kasetsart University. It has studied using *Neochetina Eichhorniae* Warner, which is an insect that is a natural enemy of water hyacinth, to eradicate the water hyacinth.

Based on the study "The Use of *Neochetina Eichhorniae* Warner to Control Water Hyacinth In Thailand Using Biological Methods," which was conducted by a research team headed by Mr Wiwat Suasaad, Mr Koson Charoensom and Mr Banphot Na Phomphet, it has been learned that this is a type of insect that can be bred in order to control water hyacinth. It does not pose a danger to other economic crops. It originates from the same place as water hyacinth, that is, South America. But it can survive in Thailand, and it can reproduce in only 8 days.

*Neochetina Eichhorniae* Warner will destroy only water hyacinth (based on the research). In South America, it controls amounts according to the natural life cycle of the water hyacinth and does not allow the amount of water hyacinth to become excessive.

This group of researchers said that water hyacinth has spread so much in other places because it has no efficient natural enemies in these areas. For example, in the case of Thailand, there are several types of insects, such as grasshoppers and certain caterpillars, that eat water hyacinth. But compared with the destructive capabilities of other



types of insects such as *Neochetina Eichhorniae* Warner, grasshoppers are much less efficient.

This insect eradicates water hyacinth through its own life cycle. They are natural enemies that are constantly in battle. Based on the studies, when this insect hatches from the egg, when it is known as a grub, it initially is very small. It eats the stalks of the water hyacinths down to the roots. This is why the water hyacinth cannot grow or propagate. Once it reaches the roots, it bores through the root to the outside in order to find a place to form a chrysalis near the roots of the water hyacinth.

This insect forms a chrysalis near live water hyacinth roots only. Before entering the chrysalis, it gorges itself on the roots nearby until it is satiated and this is why the water hyacinth cannot grow. It relies on the life of the water hyacinth root to help it grow.

After emerging from the chrysalis, this insect grows to full size, breeds and resumes its "war" against the water hyacinth.

From the tests that were conducted, it was learned that the water hyacinth in the laboratory were incapable of producing new shoots after this insect ate down to the root and bored out to form a chrysalis.

However, the researchers have admitted that little research has been done on *Neochetina Eichhorniae* Warner since this insect was introduced into Thailand only recently. More research must be done.

#### The Problem of the Ministry of Interior

But regardless of whether people are thinking about eradication projects or about making beneficial use of the water hyacinth, the unit that is so sick and tired of this problem that it becomes angry when [people] accuse it of using paraquat to eradicate water hyacinth is the Ministry of Interior.

The Ministry of Interior has long considered the eradication of water hyacinth to be a national policy. Not only has it requested cooperation from the sectors concerned, particularly the Ministry of Agriculture and Cooperatives, but it has also ordered all subordinate units to carry on things in accord with the ministry's water hyacinth eradication program in order to solve this problem quickly, a problem that is becoming even more serious.

The water hyacinth eradication project of the Ministry of Interior has been conducted on a large scale several times in several periods. The most recent campaign, which is still going on today, began on 1 October last year. Eradication efforts will be carried on for 6 months. The

Ministry of Interior issued a notice on 28 September ordering all provincial governors to mobilize local manpower from both the public and private sectors, especially the scout leaders, Village Scouts, Volunteer Defense Corps, students, clubs, associations and people in general to participate in the project.

As for the water hyacinth control and eradication measures, the Ministry of Interior has ordered the provinces to carry out the following:

1. Direct destruction:

It must be eradicated using mechanical means: This must be done by controlling water levels and by using man, animal and machine power.

It must be eradicated using chemicals: Chemicals that do not harm the environment, that are cheap and that are of good quality must be used.

2. Eradication through making beneficial use of the water hyacinth:

The production of composted fertilizer and fresh-plant fertilizer must be promoted.

The cultivation of straw mushrooms must be promoted.

Cottage industries such as weaving hammocks and handbags must be promoted.

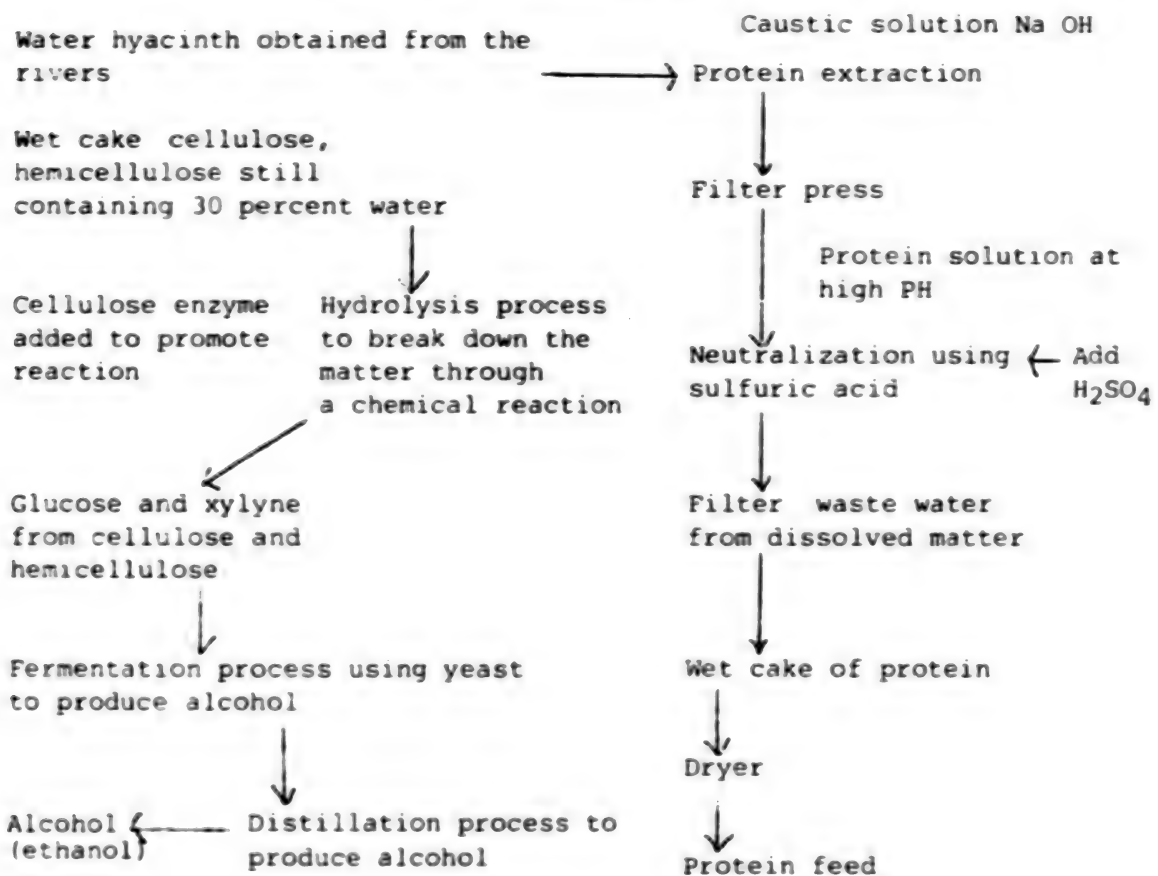
Using it as feed for animals, such as swine, must be promoted.

However, the Ministry of Interior's present problem in eradicating the water hyacinth, as expressed in Article 4 of this notice, is a lack of funds. Thus, it has requested that the provinces tell the provincial, municipal and sub-municipal agencies to discuss the matter and help by providing funds.

The Ministry of Interior, or the "Klong Lot Mafia" as it is referred to jokingly, has served as the forward unit in the fight against water hyacinth for more than a generation, but it has still not won. Water hyacinth has continued to spread to the point where there is the fear about where the interior "mafia" will be chased to if the "suicide squads" of the water hyacinth one day sneak into the "Klong Lot."

Because when that time comes, the "Klong Lot Mafia" positions will include water hyacinth.

Chart showing the process for producing alcohol from water hyacinth



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UTILIZATION AND DISPOSAL OF SOLID WASTES IN CHEMICAL INDUSTRY DESCRIBED

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[Article by Ing. Karel Vurm, CSc.]

[Text]

Chemical industry produces annually millions of tons of products so much required by the national economy, but at the same time, it also produces great amounts of liquid and gaseous wastes.

With its production of about 900,000 tons/year of industrial wastes (excluding the power wastes) the chemical industry occupies the fourth place in the CSR, just after the metallurgical production, and food-stuff and consumer industries. Although by their volume the wastes of chemical industry do not belong to one of the first places, they belong to the most harmful ones. Some of them are so toxic that they represent a serious danger with regard to the disturbance of the ecological balance in nature, and with regard to the man himself.

The development of industrial production resulted in the recent years to the fact that the obtained raw materials and products were not utilized to maximum, and the wastes contained often also materials which could be further utilized. After a contemporary period of a highly developed industrial production, during which no attention was paid to the consumption of raw materials, power, and to the amount of wastes, today we inevitably return to more efficient repeated utilization (recycling) raw materials and wastes in the sphere of production, as the gradual exploitation of natural raw material resources requires their rational utilization.

This situation is particularly topical in the chemical industry, which ranks among the raw material and power demanding branches. Chemical products are typical by the fact that about two thirds of their production costs consist of costs for raw materials and power.

Therefore, the complex utilization of raw materials and energy in the production of chemical products

is just because of that very urgent, and the solution of the problems concerning the chemical industry wastes becomes one of the utmost importance.

#### Solid Wastes in Chemical Industry

The spectrum of solid wastes in chemical industry is a very broad one. As for its quality, it is a variety of inorganic and organic substances, corresponding to the character of the chemical production. The sources of the wastes are not reacted raw materials, impurities contained in the raw materials by-products of chemical reactions, auxiliary substances for chemical or physical processes. The wastes include also sludge produced in the operation of mechanical, chemical, and biological waste water treatment plants.

Production of solid wastes in the chemical industry of the CSR (Unichem and Chemopetrol Concerns) in the period of 1978—1980 is illustrated in Fig. 1.

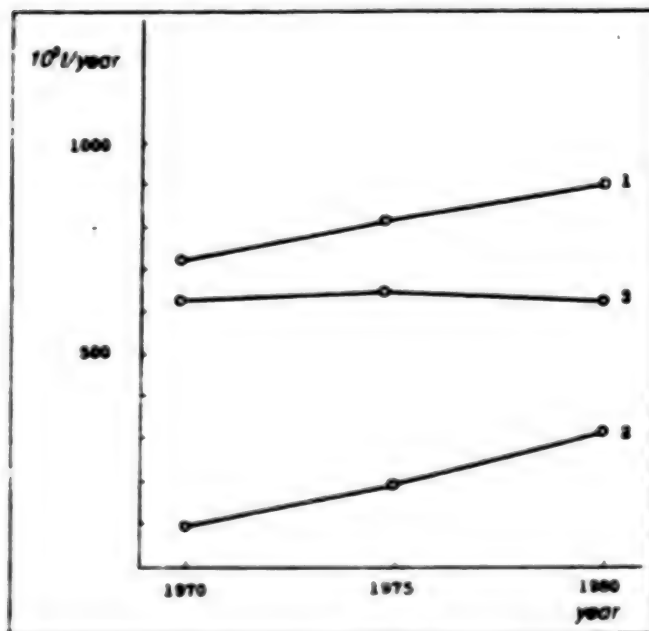


Fig. 1 Development of production, utilization and disposal of wastes the chemical industry of the CSR

- 1 — production of solid technological wastes
- 2 — utilization of solid technological wastes
- 3 — solid technological wastes for dumping sites

Over one half of the total amount cover a few types of wastes, such as waste gypsum — about 250,000 tons/year, green vitriol — 100,000 tons/year, soda plant waste — 55,000 tons/year, carbide lime — 40,000 tons/year, sodium sulphate — 30,000 tons/year and various kinds of clays — 40,000 tons/year (values are in tons of dry matter per year).

The remaining amount of waste (about 40%) includes wastes of different origin and composition, produced in different plants of chemical industry. If we take into consideration that several thousands of compounds are produced in the manufacturing processes, then practically each of them can be one of the waste components.

The broad variability of solid wastes, from the aspects of quantity (except for some types of bulk wastes they include usually low-tonnage wastes), state (solid, paste, sludge), structure, content of harmful substances, heat capacity, toxicity, aggressivity, storability and handling, is a serious obstacle from the aspects of their utilization and disposal.

#### **Utilization of Wastes**

One of the methods how to prevent harmful effects of wastes on the environment is their direct utilization; moreover, utilization of wastes can contribute to a more complex valorization of raw materials.

During the last ten years the per cents of wastes utilization has increased three times in the chemical industry of the CSR. However, one has to state that in the majority of cases the utilization of wastes was caused by ecological reasons, especially in case of heavy-tonnage wastes. The increased utilization of wastes resulted from a number of measures adopted and implemented at the end of the Fifth and during the Sixth Five-Year Plan; the decisive ones are as follows:

1. Application of waste carbide lime from the production of acetylene in the building industry and for private purposes. At present, more than 32,000 tons/year of carbide lime are used in this way, i. e. the degree of utilization is about 90 %.
2. From the production of viscose fibres approximately 30,000 tons of sodium sulphate is produced as a waste: the whole amount is used in the glass works Sklo Union Teplice and by the Association for Chemical and Metallurgical Production ("Spolek pro chemickou a hutní výrobu") Ústí nad Labem.
3. Industrial gypsum — in the production of titanium white in Chemopetrol, Trust, in Píseň Chemical Works there is a waste of about 100,000 ton of dry matter of calcium sulphate per year contaminated by hydrated iron oxides which is formed during neutralization of acid waste waters. By 1979 the neutralization sludge was discharged to a sludge bed. In 1980 an equipment was put into operation which converts the neutralization sludge into the so called industrial gypsum.

The waste calcium which is in aqueous suspension is supplied to pressure filtration (filter presses), being thus thickened to about 50 %, and then it is dried in a drum drier in order to

obtain pelleted products. The product — industrial gypsum — is used in cement works as a controller of cement setting. At present, however, serious problems with keeping the required moisture content have occurred. After mastering these, this waste suits all preconditions so as to be employed by cement works in annual amounts of 80—100 thousand tons per year.

4. From the production of titanium white 100,000 tons of ferric sulphate (green vitriol) are produced as waste. 35,00 tons/year of green vitriol are used in the production of ferric red ( $\text{Fe}_2\text{O}_3$ ), 25,000 tons/year are used in water treatment and in production of fertilizers.
5. The residues after lime slaking ( $\text{CaO}$ ,  $\text{CaSiO}_3$ , residues of resinous materials) are provided for farmers in the amount of approx. 25,000 tons/year free of charge as an additive to acid soils which should be supplied with calcium.

From a number of less extensive measures we would like to mention the following ones:

- utilization of used bleaching clay in brickworks and in the Chvaletice power plant (3,000 tons/year)
- application of waste from limestone grading (the so called under-sieve proportion) in the amount of 5,000 tons/year for road repair
- application and processing of the whole waste from lime grading (under-sieve proportion) in the building industry (4,300 tons/year)
- application of semi-refined paraffin in the rubber and wood-working industry (3,000 tons/year)
- sale of waste of sodium sulphite from the production of beta-naphthol to paper mills and for export (5,300 tons/year)
- use of ferric sludge from Béchampé reductions in the field of metallurgy of iron (3,300 tons/year)
- application of waste from the production of citric acid as fodder in agriculture (approx. 3,500 tons per year)
- in the production of saccharin about 650 tons/year of manganese sludge waste are produced. All of this manganese sludge waste is dispatched to the Association for Chemical and Metallurgical Production in Ústí nad Labem, where it is used in the production of potassium permanganate.

There are plans to use the solid wastes also in the future. For instance, further utilization of green vitriol from the production of titanium white should involve its processing into precipitated ferric pigments of different colours (yellow, brown, red). There are also considerations about processing the green vitriol into ferric chloridosulphate, which



finds wide application possibilities as a coagulant in waste water treatment.

During the 7th Five-Year Plan soda waste calcium sludges should be used for the production of calcium fertilizers.

In order to test the possibilities of utilization of waste plaster from the production of hydrogen fluoride in the building industry, as an additive into flooring materials, a pilot plant unit is to be built for the treatment of waste plaster with a capacity of 1,500 tons/year.

There is a proposal concerning the utilization of waste cobalt-molybdenum catalysts by burning and grinding them in order this waste could be used as the source of trace elements for fertilization. At present, field trials are carried out.

### **Reduction of Waste Amounts in Technology**

The way to solution of problems of wastes must be looked for not only in higher utilization of solid wastes, but also in a direct approach — in modification of the basic technologies. Reduction of the quantity of wastes produced in technological flows becomes one of the basic trends of the technical development of the chemical industry.

The problems as such are classified into the field of inorganic and organic technologies, and according to the quantity of products also into heavy-tonnage products with a capacity of  $10^5$ — $10^6$  tons/year, medium-tonnage products  $10^3$ — $10^5$  tons/year and small-tonnage products below  $10^3$  tons/year.

The field of heavy-tonnage products includes in the CSR particularly sulphuric acid, superphosphate, nitric acid, ammonium nitrate, sodium hydroxide and soda. The modern production plants for sulphuric acid are examples of waste-free technologies, as it is possible to limit by absorption or elution of  $\text{SO}_2$  from the end gases its emissions to hundredths of per cents of the acid produced.

Also the industrial fertilizers are manufactured almost without formation of solid waste. For instance, the waste of fluorosilicic acid from the production of phosphoric fertilizers is caught in a form of a sodium salt and this salt is utilized in the glass production.

Also in the field of inorganic medium and small-tonnage productions involving hundreds of processes, we can demonstrate how reduced amounts of solid wastes can be obtained by the properly selected technology.

For instance, the production of phosphoric acid belongs among top producers of wastes in the chemical industry. Phosphoric acid is made from



phosphate either by the wet — extraction method, or by the thermal reduction-oxidation process. In both methods calcium salts are produced, contaminated by other admixtures from phosphates.

During the thermal process of the phosphoric acid production approx. by 65 % of more solid wastes are produced than during the extraction process. In the CSSR, phosphoric acid is produced by the thermal method, however, eventual new plants built in the future will use the extraction method with reduced production of wastes.

A considerable amount of wastes is produced in the production of titanium white. The older sulphate method used in the CSR is based on ilmenite, and the more modern chloration method is based on rutile. During the chloration process based on a better quality raw material — rutile, containing as much as 96 % of  $\text{TiO}_2$  — a lesser amount of waste occurs than in case of sulphate methods, based on ilmenite, containing only 44—64 % of  $\text{TiO}_2$  and 30—35 % of iron oxides.

However, the chloration method is not considered in the CSR, because — besides the raw material reasons (high price and lack of rutile on the world markets), one has to realize that in CSSR a part of the wastes from the production plants of titanium white is already used (application of green vitriol in the production of ferric reds and for the water treatment, production of industrial gypsum from neutralization sludges), and that the degree of wastes utilization should increase even more in the future.

Similarly, we could give a number of other examples where it is possible to reduce the occurrence of solid wastes by changing the technology. For instance, in the production of ethylene oxide double stage chlorhydric method was predominating until the end of the fifties with a waste of about 2.5 t of  $\text{CaCl}_2$  and approx. 0.05 tons of chlorinated hydrocarbons per one ton of ethylene oxide. This method was replaced by a direct catalytic oxidation of ethylene, during which almost exclusively carbon dioxide and water are produced as wastes. There is an important difference in the amount of waste waters in both processes. In the former process taking place in the aqueous phase, 60 m<sup>3</sup> of waste water per ton of ethylene oxide were produced with about 2.5 tons of  $\text{CaCl}_2$ . The new method, employing gaseous phase, produces only only 1 m<sup>3</sup> of waste water per one ton of ethylene oxide containing 10—15 kg of sodium salts.

In the production of polypropylene (homopolymer) 5—6 % of the waste product are formed, of the so called atactic polypropylene. It was necessary to develop a new catalytic system for this production, after the application of which the production of atactic polypropylene dropped to a half of the

original amount. In the Chemical Works of Czechoslovak — Soviet Friendship ("CHZ ČSSP") the waste production decreased due to this application by 2,000 tons/year.

A special feature of organic productions is that the waste are often high amounts of inorganic salts which are discharged into waste waters and utilized only to a limited degree. The development of organic synthesis, however, has been focused during the last twenty years on substitution of the auxiliary agents, which become wastes after being used in the production process, substances with no harmful effects. This can be exemplified by substitution of reducing agents, such as swarfs, zinc, sulphides, sodium, etc., by catalytic reduction with hydrogen. Another example is the attempt to substitute the conventional separation of sulphoacids by the salting out, by the technology based on a cyclic crystallization process, during which — due to different solubility of separated substances at different temperatures, a closed crystallization cycle without production of undesirable wastes can be designed.

The above mentioned examples illustrate that it is possible to achieve a change leading to reduction of the amounts of solid wastes already at the present conditions and knowledge of the technological development. Of course — because of economic and investment problems — it will take a longer period of time till this change is evident.

#### **Incineration of Chemical Wastes**

If it is impossible to reduce production of wastes and neither to find possibility of its different application, only two possibilities remain: dumping and incineration. The advantages of incineration in comparison with dumping are as follows:

1. Considerable volume contraction of piled waste after incineration. Its value depends, of course, on the structure and bulk weight of the original solid wastes, but it is usually 10—20 % of the volume and 30—50 % of the original weight.
2. Hygienic or toxic sterility of the incinerated wastes. By perfect incineration often very poisonous or unpleasantly smelling compounds can be converted into less toxic substances ( $\text{SO}_2$ ,  $\text{HCl}$ , nitrogen oxides or phosphorus oxides, etc.), and these can be dispersed in atmosphere through a sufficiently high chimney.

In case of less toxic compounds — which are more common in chemistry, such as various sludges, boiler residues, spoiled charges, and the like, the danger of contamination of underground waters by leakage of harmful subst-

ances through subsoils can be avoided by their incineration.

3. A specific feature in case of liquid organic wastes is prevention of fire danger of different sporadic deposits or oil and pitch setting pits. Good incineration properties and their heating capacity are on the other hand an advantage if they are used as a stabilizing fuel during incineration of a mixture of different wastes.
4. Possibility of using the wastes as secondary power system raw materials for steam production.

A long list of advantages of wastes incineration awakes a feeling that the problem of disposal is in fact solved, only investments and suppliers are necessary. However, incineration of chemical wastes is not so simple. What is the difference between the incineration of e. g. municipal wastes and chemical wastes.

First of all, it is the already mentioned wide scale of wastes from the aspects of state, structure, heating capacity and ignitability, content of harmful substances, chemical aggressivity, toxicity, and the like. A typical feature is also difficult storing and bad handling of the chemical wastes in comparison with the municipal ones.

This concerns particularly viscous or pasty distillation residues discharged continuously from the production in small amounts and which can be mostly transported only when hot. Transportation by pipelines or pipings is expensive — especially for longer distances, rather difficult and unreliable in winter. Transportation in containers is cheaper, but increase the requirements for manpower, and it mostly complicates the furnace feeding equipment.

The chemical character of wastes determines also more rigorous requirements concerning their perfect incineration, as there is a possibility of formation of a number of toxical substances, such as phosgene, hydrogen cyanide, etc. Some more spread wastes — such as PVC polystyrene or polyurethane — represent a lesser danger of pollution on deposit sites than do the products of their imperfect incineration, especially of greater amounts. For instance, in case of thermal decomposition of polystyrene also styrene is produced with ethylbenzene and benzene, the maximum allowable concentration in the air is enormously strict ( $0.015 \text{ mg/Nm}^3$ ).

Chemical wastes have several times higher heat capacity, ignitability and other positive properties from the aspects of "fuel" materials (ash, water, etc.).

Their power utilization is thus taken for granted. However, there are some specific factors which are overlooked and which are evident only after a deeper analysis, particularly high specific costs for incineration of 1 ton of wastes, unfavourable requirements of attendance of small incineration plants, and necessity of more or less continuous operation of the incineration plant either because of perfect incineration or with respect to the high consumption of good quality fuel for heating up.

One can state that in case of smaller incineration houses the present steam production brings about a number of problems, as the operational conditions in a smaller incineration house can remarkably change even within one shift. From the aspects of function, the first place is held by the requirement of operational reliability of the plant as an expensive sanitation equipment for wastes disposal, and this is followed by the possibility of its unprofitability due to unreliable production of steam. On the contrary, the biggest the incineration house, the balanced its incineration regimen: it is not so sensitive to fluctuation and the considerable amount of released heat also plays its role.

At present, in the Czechoslovak chemical industry and its related branches more than 15 waste incineration plants are operating, having different capacities. They include different branches from refineries, petrochemistry, organic chemistry, pharmacy, agrochemicals, to dyes and varnishes, as well as plastics works. The incineration plants are the most attractive method of disposal of ecologically harmful wastes. In fact, there are no objections to this, but one should not forget to take into consideration also other — very often equally profitable and convenient methods of waste use in the future.

#### **Dumping of Solid Wastes**

The dumping sites of industrial wastes are so far the most common methods of their disposal in a number of industrial branches. Although at present, there are preferred the tendencies to process and utilize the wastes, one has to remember that in each industrial branch such wastes are produced which are impossible to be further processed or their processing is economically unprofitable. In such cases the dumping is the only way of their disposal.

Everyone who has ever had an opportunity to see the dumping sites of wastes from the chemical industry will agree that such a method is in most cases very inconvenient.

Except for some types of heavy-tonnage wastes (green vitriol, waste gypsum, soda plant wastes,

phospho-plaster), which form dumping sites with the only type of waste, the deposits of other wastes of chemical industry represent a variety of different inorganic and organic substances of different states and harmful substances.

Every dumping site of waste which enables leakage or elution of soluble substances represents for water sources. From the hitherto knowledge in this field it is obvious that in fact no safe wastes exist.

A suspension of calcium sulphate was deposited for several years, which is formed in neutralization of acid waste waters from the production of titanium white into the sludge bed of the Chemical Works in Píerov ("Píerovské chemické závody"). The sludge bed is situated in the outer protective water system zone of the 2nd grade. The hydrogeological research has proved that the underground waters are contaminated by sulphates (solubility of sulphate is approx. 2 g/l) and that there is a danger of contamination of the source of potable water for Píerov could not be used in the course of 15—20 years. For the protection of underground waters a hydraulic protection has been established, and at present a study is under preparation concerning special protection of the sludge beds in the form of a diaphragm wall. Both methods are rather expensive.

The possibility of the escape harmful substances even from considerably well protected deposits can be exemplified as follows: In 1979 leakages of green vitriol deposits into water were observed in the Chemical Works of Píerov. The dumping sites were designed as impermeable bath tubs with asphalt-damp-proofings insulations. After they started to fulfil their function, the insulating covers of one of them were mechanically damaged which caused the leakages. The problem was solved by insulation of the dumping sites using a closed clay-concrete wall, and the costs for its erection exceeded 20 mil. Crowns.

Frequent contamination of surface and underground waters by leakages or eluates from the dumping sites results in increasing requirements of public authorities to ensure new and perfect dumping sites. To meet these requirements, the designers have to choose economically unprofitable and demanding designs the implementation of which at the presently available means and possibilities is impossible.

### **Conclusion**

In 1972 the Government of the CSR appointed the minister of forestry and water economy of the CSR to work out the problems of utilization and disposal

of solid wastes. Thus, we have already passed a decade of the fight against piling industrial wastes. Along with a number of positive factors also principal obstacles have appeared which must be discussed on a higher level as they are related with several branches, and often with the entire national economy.

Use of low-waste or waste-free technologies will call in many cases for increased research, investment and operational costs. If the criterium for implementation of certain tasks is only the economic effect calculated according to the valid factors, then targets of the type of "low-waste and waste-free technologies" are included into the research aims only with great difficulties under the existing methods of planning. It would be, therefore, necessary to include among the criteria for considering the research problems to be solved also the economic contributions from the aspects of biosphere.

The incineration plants of industrial wastes as well as dumping sites of wastes represent rather high investment costs, and can be constructed under our conditions only as associated inter-branch investments in certain localities. How to simplify and make more convenient the association of more manufacturers of wastes in a certain agglomeration providing cooperation programme of disposal or utilization of their wastes on big efficient units built in a selected works?

Waste disposal is not and cannot be only the technical matter of the manufacturers themselves. The wastes in the industry are not produced with the purpose to have something to dispose of, but on the contrary, they must be disposed of so as to be able to produce more of everything required by our society.

CSO: 2020/20



## DAIRY FARMING BECOMES LAND USE, ENVIRONMENTAL ISSUE

Hamilton THE ROYAL GAZETTE in English 9 Feb 83 p 1

[Text] Agriculture Minister Dr. the Hon. John Stubbs yesterday firmly stated that Government will no longer subsidise the dairy farming industry in Bermuda.

He was replying to a call by environmental groups for Government to purchase 17 acres of land at Outerlea, Smith's, so that evicted farmer Mr. Harry Kromer can save his large dairy herd.

The groups, including farmers, SOS and Oasis, asked for a firm commitment to dairy farming.

But Dr. Stubbs replied: "Government has supported the dairy industry this many years by prohibiting importation of fresh milk. The comparative cost of producing fresh milk locally versus importing it has increased alarmingly in recent years.

"The quality of fresh milk produced locally has been erratic, to say the least. It has never been Government policy to bring about the demise of the commercial production of milk, but it has become increasingly difficult to justify the heavy price consumers pay for fresh milk."

The Minister said Outerlea had been "totally denuded" by previous dairy farming there. This was one of the environmental considerations, he said.

Government had not completely ruled out the possible purchase of the land but there was no definite proposal to do so.

"We are not opposed to dairy farming

and will do all we can to protect small herds people have as a hobby," said Dr. Stubbs. "But they are not viable on a commercial scale and we are not going to do anything further to subsidise dairy farming."

Dr. Stubbs said Mr. Kromer wanted a fairy godmother to come out of the clouds with a wand and rent him land for his herd.

"Government has been assisting the dairy farmer at vast public expense this many years. There comes a time when the book is not worth the candle."

The proposals of the environmental groups just added to the confusion, said the Minister, adding: "All of these interested groups know we are tackling the total problem on an Island-wide scale."

Dr. Stubbs said a survey of arable land had been drawn up and a similar probe of open spaces was nearing completion. A firm decision on action to be taken would be made when the reports had been studied, he said.

The Minister pointed out that the beneficiaries of the Outerlea land were not all non-Bermudians, as said in a statement by the environmental groups.

Also, he said: "The implication that land owners may be discriminated against if they are non-Bermudian is contrary to any sense of justice. They have to be dealt with fairly."



METROPOLITAN WATER SUPPLY STILL IN QUESTION

Mexico City PROCESO in Spanish 14 Feb 83 pp 6-11

[Article by Miguel Cabildo, Emilio Hernandez and Ignacio Ramirez: "Now Halted, Cutzamala Was Merely a Palliative; Capital City Without Sources of Supply or Money to Create Them"]

[Excerpt] With the low-water mark reached during the first few days of February, there will not be enough water to recover from the harsh reality of the situation: Residents of the capital will go through their worst shortage this coming season due to a lack of budget funds, immobilized projects, an inadequate supply system, pipes in the worst possible condition and leaks that will make the problem more and more serious as opposed to the optimism and false promises of the authorities.

There is no viable solution to the problem of meeting the needs of the people in connection with this, either from the technical or the economic point of view.

The impossible was promised.

On 27 July 1978 Carlos Hank Gonzalez, who was then superintendent, assured us that before 1982 Mexico City would have adequate drinking water and drainage systems and an anti-air pollution program that would enable us to launch the ecological recovery of the entire metropolitan area.

Four years later optimism, demagogy and victory-promoting airs reached their climax on 3 May 1982 with the inauguration of the first phase of the Cutzamala System.

Hank Gonzalez himself as well as then President Jose Lopez Portillo and Secretary of Agriculture and Water Resources Francisco Merino Rabago agreed that this project would solve the problem of the national capital's water shortage. "Spectacular," "incredible," "gigantic" and "impressive" were the descriptive adjectives employed when Jose Lopez Portillo opened the valves at Cutzamala: There would be no shortage of nor would anyone lack water.

The real situation is different:

The shortage will amount to 5.6 cubic meters a second during the half of the low-water season that comes to an end at the end of next May.

Over 2 million residents of the capital will suffer the most severe shortages. Thousands of other residents will suffer shortages to a lesser extent.

Half of the 4 cubic meters the Cutzamala System contributes is distributed in the State of Mexico. The other half, 2 cubic meters, benefits only 750,000 residents of the Federal District.

Due to breaks in the distribution networks, 8 cubic meters of water a second are lost.

Approximately 3 million residents of the capital are not served by a sewage system, fundamentally in the southern and southeastern areas of the Federal District.

The drainage system has deteriorated, particularly as a result of cave-ins in the city. This phenomenon has been most prevalent in the lake area of the Valley of Mexico where cave-ins reach a depth of 9 meters in those areas most affected.

Due to devaluations of the peso and the economic crisis, the operating costs for the next phases of the Cutzamala System are mounting day by day. From November to date they were increased by 25 percent. At present it costs 2 billion pesos to bring in 1 cubic meter.

Once this system is completed in 1985, when it will supply 19 cubic meters a second, it will absorb 6.5 percent of the national consumption of electrical energy. Work on the system, however, has come to a halt and they are behind by a year.

To give the reader an idea of the fact that the Cutzamala System is not a panacea, there is the fact that per capita consumption amounts to 300 liters per resident per day, 75 of which are destined for individual use and the rest for services and household consumption. Furthermore, the water that comes from the Villa Victoria Dam, which supplies the system, is not equitably distributed, but only to certain segments of the population. As we can see, this water supply — 2 cubic meters for 750,000 residents — is merely a palliative for the serious problem of scarcity.

To the above must be added the heavy flow of migrants from the interior of the country, estimated at 600,000 people a year, which, combined with demographic growth rates by births, results in a total of almost a million more residents a year. Including the metropolitan area, the current population of the Federal District is over 15 million people.

Mexico City is located at over 2,000 meters above sea level and covers an area of 520 square kilometers. The total surface area of the Federal District is 1,495 square kilometers. Fifty percent of the nation's economic activity is concentrated here, 80 percent of its wholesale trade, 90 percent of its industry,

40 percent of its foreign tourism, 60 percent of the energy available for the entire nation, 60 percent of its financial resources, 30 percent of the food produced and 19.5 percent of the working population.

Prior to the partial inauguration of the Cutzamala System, the volume of drinking water destined for the Federal District was 38,600 liters a second, 6,000 of which were destined for public and municipal use, including losses incurred in the system. Of the remaining 32,000, household use accounted for 62 percent, commercial and service use 22 percent and industrial use 16 percent.

At present the supply comes from overexploited aquifers in the valleys of Mexico and Lerma through 1,366 wells operated by the Federal District Department in the municipal and private systems of Lerma, Xochimilco-Mixquico-Xotepingo and Chiconautla. The highlands of the southeastern part of the Federal District are supplied by springs that provide over 300 liters a second. Since 1973, the Valley of Mexico Water Commission, a subsidiary of the Department of Agriculture and Water Resources, has been supplying it with the complementary volume. The commission is responsible for the Cutzamala System and plans to bring water from the Amacuzac and Tecolutla Basins.

#### No Budget

However, these objectives can only be achieved with difficulty, at least the short and median-term objectives. The reasons are very simple: There is no budget, which has also set them behind by almost a year in work on the Cutzamala System, suspended since 5 May 1981 when the system went into operation. In spite of which engineer Elias Sabat Mammad, the executive director of the Valley of Mexico Water Commission, maintains that a budget of 11.4 million pesos has been allocated for this year. One thing is certain and that is that up to now no appropriation has been made to continue work on the Cutzamala System.

A tour of the system's filtering plant in Los Jerros, State of Mexico, confirms the fact. Incomplete foundations, loose rods without columns, fragments of concrete pipe and derelict steel reinforcements everywhere, cranes for water pumps ranged about and half-finished inoperative filter modules are conspicuous on the 40 hectares on which the plant is located. Of the 2,000 workers who worked on the job until the middle of last year only 300 are left, including secretaries, advisers and cleaning personnel.

"The work stoppage was inevitable due to the lack of a budget," declared Elias Leon Espinosa, the Cutzamala System's resident engineer, "which resulted in a cost increase of 25 percent due to the devaluation of the peso. This is not the first time this has happened, but also in 1981, when the federal government decreed a 4-percent reduction in the federal budget, the same thing happened. To date we have had no news on this matter."

Perhaps this was the reason why the projects involving the catchment of water from the Chilesco Dam, officially planned as a complement of the first phase of the Cutzamala System, were not completed. Because of this it stopped providing one more cubic meter of water. It was financially unfeasible for the authorities because they considered the dam to have an inadequate capacity.

Now, depending on how much money there is, the immediate plans are aimed at catching water from the Valle de Bravo Dam by pumping since that dam is 1,000 meters downstream.

As planned at the start of last year, the second phase would involve the catchment of 6,000 liters a second from the Valle de Bravo Dam and the third would take 8,000 from the Colorines Reservoir for a total of 19,000 liters a second, or 19 cubic meters. The project will be completed in 1985.

While this might be accomplished, on the threshold of the year 2000 we would have a water supply volume of 55 cubic meters a second, unless we obtain water from external sources, for a population of 29 million, according to demographic estimates, which would be insufficient since by that time at least 71 cubic meters would be required. In short, over 4 million residents of the capital will suffer from a shortage of water. And this does not take into account the fact that well production will have dropped to a minimum, that the Lerma Basin level is declining and that there are constant leaks due to the very poor condition the distribution network is in.

This reality has put a stop to the false optimism. When he appeared before the Chamber of Deputies in mid-December of last year, director Aguirre Velazquez said: "The volume of 40 cubic meters a second that reaches the capital is insufficient to meet the demands of the population in view of the fact that the latter is constantly growing. During the months of February through June the low-water season will make the problem worse since, on the one hand, the demand for water increases as the temperature rises and, on the other, the volume that comes from the Lerma Basin will drop by 2.5 cubic meters a second."

The head of the Federal District Department also estimated that an average of 42.6 cubic meters of water per second would be required for the period from January to June this year, which would produce a shortage in the volume of 5 cubic meters a second. And he admitted that two programs have been suspended due to financial problems in 1982: the completion of complementary projects to close main line circuits, which will cause problems due to a lack of pressure, and the overhauling of wells in the Lerma Basin and the Federal District, which will also produce a supply shortage.

As for engineer Andres Moreno Fernandez, the general manager of the Federal District Department's Water System Construction and Operation Division, he went even further. He said that Mexico City will be facing the most severe, widespread shortage of drinking water in its history, because of which 2 million residents of the capital will experience the worst scarcity due to a shortage of 5.6 cubic meters of water a second during this coming season.

The prospects for the future in the Valley of Mexico were described by him as difficult and dramatic — "the nation will have to make a real sacrifice so that the capital may continue to exist" — and he added that the scarcity of water in this low-water season will be severe and produce serious problems in the Federal District, particularly in the districts of Miguel Hidalgo, Atzacapotzcalco, Alvaro Obregon, Magdalena Contreras, Coyoacan, Benito Juarez and Cuauhtemoc. "There will be areas like Las Lomas," he said, "where people will certainly have to stop watering their gardens."



The most populous areas, among them Iztacalco, Iztapalapa, Xochimilco and Tlahuac, will be facing another problem: The western drain will be overfilled and, therefore, the water will rise — flow out of the grates when it rains — producing flooding in the lowlands, water that is wasted, which is why the government is going to, "insofar as the budget permits," start work on "several tunnels to the so-called national canal near the Abastos Plant to divert the water.

#### Loss of 8 Cubic Meters

Due to the lack of an adequate supply network and the very poor condition the pipes are in, there is a loss of 8 cubic meters of water a second as a result of the breaks in the distribution system. It is estimated that the poor condition of the water facilities is affecting 2 million homes, 30,000 factories, 120,000 businesses and 60,000 establishments of various sorts located in the metropolis.

On the other hand, 3 million residents of the areas peripheral to the capital do not have adequate sewage service, which produces pollution of rivers, basins and water tables. The most serious situation appears in the areas to the south and southeast of the city where 1.4 million people live. The other great concentration of people deprived of this service — 1.2 million — is located in the Gustavo A. Madero district in the northern area.

When his turn came, engineer Guillermo Guerrero Villalobos, the ex-secretary of the Federal District Department's Operations and Services Division and one of the chief promoters of the Cutzamala System, admitted that overexploitation of the aquifers gives rise to two kinds of problems: on the one hand, the possibility of extracting water the quality of which is not suitable for all uses. And on the other, cave-ins are produced due to the compacting of the soil. This phenomenon has been very prevalent in the lake area of the Valley of Mexico where cave-ins reach a depth of 9 meters in the areas most affected.

The truth of the matter is that the drainage system has particularly deteriorated due to cave-ins in the city. In fact drains that originally discharged their contents by means of gravity now require the aid of pumping stations to move the water they convey. Moreover, the electromechanical installations and drains themselves are becoming prematurely obsolete.

Along with this, the disordered growth of the urban area in the Federal District has produced changes in the use of the land which, combined with deforestation and erosion, increase the volumes and peak flows of the waterways in addition to transporting sediment which reduces conduit capacity, adds to costs and makes maintenance difficult.

Bernardo Quintana, the chairman of the ICA [Associated Civil Engineers] Group Administrative Council, has put his finger on the sore spot on more than one occasion. In his opinion, the water problem in Mexico City has no equal anywhere in the world and in spite of this it is the city that is growing most rapidly among all the major cities. "Supplying a resident of the Federal District with water," he said, "currently costs five times more than in any other

big city in the world and soon the ratio will be 10 times inasmuch as we will have to resort to sources that are farther and farther away and at lower altitudes."

Commenting on the irreversible decision to bring water in from Cutzamala, the builder said that 6.5 percent of the country's total electrical energy production would be needed to pump the 19 cubic meters per second that will be brought to Mexico City from there. "It is indispensable for us to discontinue adopting these sorts of emergency decisions to resolve the problems of the capital and to more decisively orient our actions and resources toward some other plan for urban development."

11,466

CSC: 5000/2015

## BRIEFS

SNOW FOR DRINKING WATER--Israel is planning to store water from melted snow on the Hermon Mountain and to use it as water for drinking and agriculture in the northern Golan Heights. Our correspondent Gadi Sukenik reports it will be possible to store 40 million cubic meters per year. The quality of the water is excellent and it will be possible to get it to the consumers with the help of gravitation without spending money on energy and even use the water's flow for the production of electricity. Water commissioner Tzemah Yishay told our correspondent that the investment in this project is estimated at \$40 to \$50 million. [Text] [TA110717 Jerusalem Domestic Service in Hebrew 0500 GMT 11 Mar 83]

CSO: 5000/4511



## BRIEFS

INSECTICIDES CLAIM REJECTED--Kenya has dismissed reports in a Swedish newspaper that people are dying of effects of insecticides sprayed on coffee plants. Addressing 66 members of a world coffee buyers trade team at a Nairobi hotel on Thursday, a nominated MP and a member of the Coffee Board of Kenya, Mr S. G. Michoma, termed the reports false and malicious. He said he hoped the reports would not affect the amount of coffee exported to Scandinavian countries. Earlier, the chairman of the Coffee Board of Kenya, Mr Njiiri Karango, said the coffee research station had embarked on a programme to curb the tainting of the plants by chemical residues. This, he said would reduce the use of the insecticides when disease-resistant coffee plants are introduced in 1986. [Text] [Nairobi DAILY NATION in English 26 Feb 83 p 5]

CSO: 5000/138

# MAIZE FIELDS WITHER; WATER TABLE LOW

Windhoek WINDHOEK OBSERVER in English 12 Mar 83 p 34

[Text]

**OTJIWARONGO:**  
Farmers in this area have almost abandoned hope for more rain in the present season.

Indications on Monday were however, that a front could be moving in and cloud formations could be seen in the distance, even as far as the *Bie Province* of Angola, when flying at an altitude of 10 000 feet above sea level, for visibility was excellent throughout a flight of several hours, reaching at its furthest point the southern frontier of Ovamboland.

Most of the bigger farmdams in the Otjiwarongo region did catch water in the early rain which fell in the first week of December, followed up by showers in the first three weeks of January and then to disappear seemingly for the remainder of the season.

Most of the maize fields have withered and there is little hope of reaping a

harvest, although the young plants can of course be utilised as fodder. This is being done in most cases and if not, livestock is simply left to graze in the fields.

The region that appears to be the most lush, not only in trees and bush but also as far as grasslands are concerned, is the Waterberg Plateau. It presents a beautiful sight, for it is green, the edges of the precipices around the plateau stark brown and almost reddish.

Livestock in this region appears to be in very good condition, but with the onset of Winter in May, and if the regular west wind should once more blow in strength as it has done for the past five years, pastures, or the little that is left in existence, will suffer heavily.

The great sandy flats to the south of the Watersberg Plateau known as the *Omaheke* already shows a reddish tint. There is very little grass.

**WINDHOEK**  
**March 7, 1983**

The readings of South West Africa's major dams at 08h00 today were:

- \* Hardap at Mariental 14,6 percent  
(43,929 million cubic metres). The is the lowest it has been in the past twenty years. In fact it is precariously low and with conditions as they are, it looks as if that capacity, calculated scientifically by the engineers, will be reached in October.
- \* Naute at Keetmanshoop 39,8 percent  
(33,290 million cubic metres)
- \* Von Bach at Okahandja, 40,5 percent  
(20,241 million cubic metres)
- \* Swakoppoort, sister dam of Von Bach 70km to the west in the Swakop River 4,5 percent (3,0966 million cubic metres)
- \* Friendenau south-west of Windhoek 15,9 percent  
(1,069 million cubic metres)
- \* Goreangab 35,0 percent (1,815 million cubic metres)
- \* Avis Dam 38,9 percent (0,946 million cubic metres)
- \* Daan Viljoen at Gobabis 16,4 percent  
(0,042 million cubic metres)
- \* Tilla Viljoen at Gobabis 4,4 percent  
(0,055 million cubic metres)
- \* Olushandja in the Ovambo-speaking region 10 percent (4,210 million cubic metres)
- \* Omataku 12,7 percent (5,121 million cubic metres)
- \* Otjivero Dam in the Nossob River near Omatara 35,2 percent (2,465 million cubic metres)

## ROLE OF NEW ENVIRONMENT COUNCIL DESCRIBED

Johannesburg THE STAR in English 3 Mar 83 p 10

[Article by Keith Cooper: "Will South Africans Meet This Big Challenge?"]

[Text]

Government and non-Government conservation bodies, as well as the public, will be watching closely to see if the new Council for the Environment can achieve the action so desperately needed to resolve the numerous conservation problems facing South Africa.

That conservation is in a mess is clearly evident from the recently published "Policy and Strategy for Environmental Conservation in South Africa," compiled by the Wildlife Society of Southern Africa. The document identifies the problem areas and proposes a strategy to overcome them.

In preparing the document the Wildlife Society asked itself two key questions:

- What would the ideal state of environmental quality be under conditions of double the current population, predicted for the year 2005?

- What would the ideal state of environmental awareness be among the citizens of the nation at that time?

Four main issues were identified:

- The conservation of viable representatives of South Africa's full diversity of species, ecosystems and landscapes.

- The maintenance of the potential productivity of renewable natural resources.

- The maintenance of minimum pollution levels.

- The development and maintenance of positive attitudes towards conservation.

How does South Africa stand in relation to these issues?

In terms of the amount of land set aside for conservation (at present about 4 percent) we are badly off.

Considering the vast areas of poorly managed agricultural land there is considerable scope for the creation of many more large conservation areas where the land and its natural resources can be properly managed.

resources can be properly managed.

Only 29 of the 79 different veld types have examples adequately conserved and there is an urgent need to have examples of the rest set aside.

The status of wetlands (rivers, streams, marshes, vleis, pans, swamps and lakes, etc) in the Republic is critical.

Most of South Africa's 196 lagoons and estuaries have been severely degraded and many damaged beyond repair.

The conservation of our coastline is seriously threatened. The Wildlife Society and the Habitat Council have jointly proposed 40 new marine reserves in SA.

There is a need for whole landscapes in the Republic to be conserved as "biosphere reserves." Areas that come to mind include the Drakensberg, Magaliesberg, Cedarberg and the Richtersveld.

Of the approximately 17 500 species of South African plants, 1 945 species are threatened, as are 71 mammals, 101 birds, 23 freshwater fish, 9 frogs and 37 reptile species.

On the issue of renewable natural resources our attention must be

directed firstly to our soil. By 1963 it was estimated that soil erosion had already destroyed more than 25 percent of the original fertile soil reserves.

While the major responsibility for the deterioration of the natural soil resources must be placed on ineffective government policy, the real cause is the lack of appreciation of conservation principles by most of the country's 77 000 white farmers, who control 71 percent of the nation's land.

Many are absentee landlords, leaving the management of the farms to inadequately trained farmhands. Overgrazing in black homelands where some 33 percent of the country's population occupy 13 percent of the land area, has severely reduced the agricultural and conservation value of large areas.

Further problems of major concern have arisen through the invasion of poorly managed veld by indigenous and alien weeds, severely reducing the land's capacity for livestock production.

Industrial pollution in South Africa is undoubtedly the worst in Africa due principally to our country's advanced industrialisation and urbanisation. The pollution of inland waters by industrial and urban effluents has reached critical levels in several major impoundments.

Although there has been a general improvement in air pollution control, some areas still show increasing levels of air pollution, which is a worry.

The production of solid and toxic wastes by agricultural, industrial and mining activities has already reached levels of considerable concern.

The current state of environmental awareness of the South African public has not been accurately determined but one certain feature is that it varies greatly across the spectrum. Attempts to redress this situation have generally been piecemeal and sporadic with a minimum of effort towards the lower sections of all races and cultural groups.

It is also worrying that the level of awareness of certain professional groups involved, such as town planners, architects, engineers and teachers, is considerably less than desired.

These are just some of the problems facing the Council for the Environment. In its "Policy and Strategy" document the Wildlife Society proposed steps to ensure the existence and continued evolution of the greatest possible diversity of conservation.

The overwhelming majority of conservationists in SA have backed the society's document. All that is lacking is implementation and this is the number one challenge that faces the Council for the Environment.

Can it do it? Will all conservationists, whether they are government or provincial employees, work together with non-government organisations to achieve the desired result? Will the Government accept and implement the recommendations of its own Environmental Council?

If they do, conservation can look forward to a better future. If they don't, man and nature will be the poorer. Haven't we had enough procrastination?

# DROUGHT REACHES 'DISASTER, EMERGENCY' LEVELS

Johannesburg THE STAR in English 2 Mar 83 p 11

[Articles by Hannes Ferguson: "Drought Brings Almost Unbelievable Misery"]

[Text]

The survival of the whole South African farming community is now at stake as the drought in all provinces intensifies by the day.

The Department of Agriculture's situation map for February shows half of the Transvaal is now considered a "disaster" area. In another quarter of the province the drought has assumed "emergency" levels.

So far, 15 magisterial districts in the Transvaal have been declared drought-stricken. Another 12 may follow.

In these districts farmers are entitled to a ration rebate on fodder or to fodder loans with or without fodder subsidy.

In Louis Trichardt and Messina where fodder trees have not sprouted this year, even the game is dying. Farmers are told to reduce their stock numbers permanently.

They are now being financed by the State to fatten and sell from one-third to half of their cattle so as to prevent overgrazing when it rains again — which is not expected to happen before December.

Grain co-ops said that the last good year had been 1980-81. Since then the maize crop had dropped by 51 percent, the grain sorghum crop by 37 percent, sunflower by 40 percent and groundnuts by 53 percent.

This year there would be no maize for export, according to

Maize Board sources.

Throughout the Lowveld, dams and rivers are drying up.

Vegetable production will be severely curtailed during the winter and prices will be forced up, aggravating already high inflation.

On fruit farms the picking season is in full swing but the quality of the fruit is so bad some orchards are being left unpicked. Banana trees have failed to grow the suckers on which the 1984 crop depends.

In Lebowa, Gazankulu, Venda and kwaZulu the drought has brought almost unbelievable misery.

Black farmers are reluctant to part with their cattle, traditionally regarded as currency, and this makes it more difficult for the homeland governments to provide sufficient fodder.

It is estimated 800 000 head of cattle have already died.

Wells are drying up as fast as new boreholes are drilled and grain will have to be 'imported' to the homelands from South Africa.

The sugar industry is suffering a second disastrous drought season in four years.

The Zululand and Northern Natal cane growers expect a cane crop of only 70 to 80 percent, which at present depressed sugar prices will mean severe financial loss for most planters.

Northern Natal is as drought-stricken as the Eastern Transvaal. The Utrecht district has been worst hit but even in the Midlands maize crops have failed and rivers and wells dried up.

In the Free-State only half the maize crop is expected.

In the sheep farming grassland areas farmers have had no rain for the planting of any fodder crops. Lucerne, taff and hay are fetching unheard-of prices.

The whole of the Northern Cape is a disaster area.

The grain and fruit farmers of the Western Cape have been

fortunate in experiencing a normal season. Wheat crops in the Swartland and Ruens areas have been good.

To the north, however, beyond Vanrhynsdorp, the Western Karoo is experiencing its seventh year of devastating drought. The desert is encroaching from the Namib and has already reached the Calvinia District.

A spokesman for the Department of Agriculture at Edenburg said that a major effort on a national scale would be needed to reclaim areas for human habitation.

### Government Gets Part of the Blame

In the crop farming areas, established State policy has contributed to the near-collapse of agriculture, farmers claim.

The effect of the drought has been compounded by the continued protection of fertiliser and tractor manufacturers at the farmer's expense.

The prices of farm produce had increased by 50 percent since 1979, but the prices of farm requisites had risen by as much as 100 percent, according to the SA Agricultural Union. As a result total farming income, after interest charges, had declined from R3 134 million in 1981 and R1 000 million in 1982 to an estimated R400 million in 1983.

The normal maize crop is 12 million tons. Maize farmers must produce 80 percent of this to break even, and low export prices are a millstone around the farmer's neck, the National Maize Producers Organisation (Nampo) has said.

The Nampo executive had asked the Minister of Agriculture, Mr Greyling Westra, to decide whether he wished the maize industry to produce only for the home market. The Minister replied that maize farmers should continue to expand as an export industry.

Nampo said this was impossible, however, as long as the prices of fertiliser, tractors and other protected inputs were not pushed down. Costs of storage of export maize as well as rail tariffs to the harbours had also become prohibitive.

According to the SAAU, farmers had been obliged to take up R157 million production credit from their co-ops for the current crop. Of this about R700 million could not be paid back because of the drought. From the previous year, there had already been a backlog of R300 million. Before the financing of the next crop could be considered, farmers already owed their co-ops almost R1 900 million. This was already putting the co-ops themselves under considerable financial strain.

The two drought years had now cost South Africa over R1 000 million in foreign exchange, cancelling out most of the recent gold bonanza, according to Nampo.

Negotiations between the SAAU and the Minister of Industries, Commerce and Tourism, Dr Dawid de Villiers, and the Minister of Finance, Mr Owen Horwood, had been disappointing.

Dr de Villiers earlier requested a University of Pretoria professor to investigate the effect of protective tariffs on the economy.

Economists criticised the arrangement, saying agriculture was too intertwined with the rest of the economy to make a piecemeal report of any practical value. In the way the project was being undertaken, it would take years, and then the agriculture sector might already have gone over the edge.



## Kalahari Bushmen Beg Workers for Food

**GABERONE** — Bushmen in Botswana's central Kalahari desert have been living off wild fruit for two months because drought-relief officials have no transport to distribute main-meal rations.

And at a drought-stricken settlement at Xade in the Kalahari 450 people are begging government workers for food, according to the local drought-relief co-ordinator, Mr K Sekisang.

As the summer rainfall season nears its end, similar scenes are common around much of Southern Africa where countries face disastrous crop losses.

In Mozambique, where farmers in the south of the country are losing at least 50 cattle every day, the Government has appealed for international help to feed four million people facing starvation.

Lesotho is experiencing its worst drought in 10 years, and there are fears that crop fail-

ures this year will be worse than the 60 percent failure last year.

In Swaziland sugar production is down five percent on the previous season.

Zimbabwe, too, faces disastrous crop and stock losses. The chairman of the Zimbabwe National Farmers' Union, Mr Gary Magadzire, said: "There has been a total write-off of crops across the country."

In Namibia there have been good rainfalls in the northern and central districts. In the south, however, the drought threatens to kill the karakul industry.

After scant rainfall across the subcontinent towards the end of last year, it was believed the drought had been broken. Now, however, it appears to be worse than ever before. It comes at a particularly bad time for Southern African states whose economies are already struggling under the effects of the recession.

## Trek to the Towns Begins

**CAPE TOWN** — The drought plaguing the Eastern Cape and the Border is the worst to hit these areas for more than 20 years.

Farmers there have been hit so hard that they are coming to the towns and cities to get feed for sheep and cattle.

Their stock is in very poor condition because grazing has almost dried up.

Large stock losses are feared this winter, and many farmers are threatened with bankruptcy.

At the end of January, 29 magisterial districts in the Cape had been declared drought-stricken, as have 13 districts in the other provinces.

Many Cape farming districts such as Carnarvon, Franschhoek, Prieska, Keimoes, Upington and Vryburg have been on the official drought list for five

years.

Some children in these areas who are starting school this year have never seen rain.

Many farmers have been forced to leave their land and look for work in nearby towns. Others say they will have to do the same if rain does not come by the end of this month.

Agricultural union officials say the drought in the Eastern Cape appears to be having an effect on the quality of wool.

The area produces about 5 percent of South Africa's annual R275 million wool clip.

Pineapple farmers in the East London-Port Alfred coastal belt, who produce most of the country's pineapples, say the drought has caused a fairly large percentage of the fruit to be sunburnt, and too much sun has also lowered the sugar content.

## Natal Faces Killer Winter

MARITZBURG — Natal is in for a killer winter, farmers in the drought-hit north said today.

A drought-stricken Utrecht farmer and executive member of the local farmer's association, Mr David Wright said: "My feed and water are running out."

"I was looking to the Buffalo River for stock water in case we have no rain but the river has also stopped flowing."

"We have so little seed that we have to get rid of cattle and even so we are being asked every day to help farmers from other districts."

He said his water supply was now a quarter of what it was at the same time last year and that had barely been enough. Most of the district was in the same position.

Utrecht butcher and farmer Mr Dawid Kemp said he had spent R14 000 on boreholes for water recently. The successful boreholes were not on the parts of his farm where they were

most needed.

Many farmers had drilled without luck and had large tracts of the land which they could not use.

He said the district was the worst it had been in two generations.

"With seed and water giving out, farmers must sell but the market is overloaded because of the drought," Mr Kemp said.

Mr Wright said about 90 per cent of the Utrecht maize crop had failed. He would prepare his wilted plants this week for stock feed but the yield was not a fraction of normal.

He said he would be partly compensated by crop insurers but many of his fellow farmers had not been able to get crop insurance.

Mr Kemp said he did not know how some farmers would keep going. They had been unable to repay the money they had borrowed to plant the previous crop and would not be able to repay the loan to finance the present crop.

CSO: 5000/125

IMPACT OF COUNTRYWIDE DROUGHT REPORTED

Johannesburg SOWETAN in English 8 Mar 83 p 6

[Editorial]

[Text] While most of us are concerned in the main with our local problems, we tend to forget the tragedy of a country-wide drought which is turning parts of this land into a dustbowl of desolation.

Almost the whole country-side has been hit by one of the worst droughts in memory, although some of us in the urban areas are hardly aware of this. White and black farmers are not only facing economic ruin but some people face the stark reality of starvation. In some rural areas there is even a scarcity of water for people, let alone for beasts, and our fears should be that the problem will not remain localised for long.

South African farmers have the consolation of a strong Government that can and has often bailed them out when the going becomes rough. What happens in the homelands is an entirely different matter. It is true that our Government has also helped these areas and had tended to infuse large sums of money into places like Transkei and Ciskei. This kind of charity cannot save the situation if it continues.

The situation in places like Transkei and the Ciskei is critical and only time will tell when we in the urban areas feel the effects in physical terms of their suffering. It is about time that we reflected on this tragedy and at the worst place it on the agenda in our various sectors.

Abstract solutions like praying for rain have had some effect ironically in the urban areas, some people feel. They claim that prayers have been confined to places and people in urban areas and that is perhaps why the situation here, where rain is not such a precious thing compared to rural areas, has not been that drastic.

Apart from praying, there must be some kind of action that urban folk can take to assist their rural neighbours. One newspaper in Durban has already started a fund for bore-holes, something that is minor in terms of the over-all problem, but tends to be exemplary. The very fact of this article perhaps was caused by this act by fellow journalists.

All is not lost however. There are organisations like the Institute of Race Relations that has run things like Operation Hunger for some time. They cannot handle the problem alone, naturally. It is also true that the State should shoulder most of the problem if the situation reaches emergency proportions.

Having said that we believe black people particularly should perhaps think of ways--and it does not matter how significant they seem--in helping others who are almost prostrated by their suffering. There is very little people in the rural areas can do when rain does not fall. We feel particularly in this period of Lent, for those who are Christian, that some thoughts should be spared on the problem. Prayer, as we have noted, also helps.

Apart from our humanitarian feelings, we should in the final analysis note that what affects those people in rural areas will inevitably have some direct bearing on us, sooner or later. We have already noted the spread of diseases.

They also happen to furnish us with our daily needs and if things in the agricultural sector collapse, we can expect our living to become even more difficult than it is now.

CSO: 5000/124

## MUD ENDANGERING HENDRIK VERWOERD DAM

Johannesburg THE STAR in English 1 Mar 83 p 3

[Article by Jaap Boekkooi]

[Text] **F**armers and townspeople in the Eastern Free State predict that the country's hydro-engineering showpiece, the giant Hendrik Verwoerd Dam, will soon vanish in a swell of mud.

At Bethulie, about one-third downstream from where the dam begins, town clerk Piet du Plessis reports that the former banks of the Orange River have "totally disappeared under the silt which is streaming in." At the town the river now looks like a mud-fringed lagoon.

"Most of the silt seems to come down from the Caledon River, which joins the Orange above the town," says Mr du Plessis. A local farmer, Mr Kit Hall, says that so much silt comes down with the Caledon River "you can almost walk on the water".

Officially the Hendrik Verwoerd Dam will silt up to 50 percent of its capacity during the next 90 years, according to Water Affairs Department studies, but from the enormous amounts of silt they see entering the dam most observers in the eastern Free State think that will happen much sooner.

The silt load of the Caledon River, which forms the border between South Africa and Lesotho, is proverbial among South Africa's hydro-engineers. Recently the river, during one flood period, silted up Welgedacht Dam south of Wepener to such a degree that the dam, main water supplier to Bloemfontein, lost one third of its ca-

capacity.

"This was really a tragedy," says Professor D C Midgley, one of the country's foremost water affairs specialists. "Soil conservation along the Caledon has improved a lot, but the river runs through a typical Cape sandstone area, and Lesotho still produces a lot of silt because of overstocked lands. An enormous amount of silt still comes down the river."

But Professor Albert Rooseboom, of Pretoria University's civil engineering department, thinks that Verwoerd Dam will not silt up faster than originally calculated.

"What is happening at Bethulie is that silt helps form a typical delta formation, but our studies have found that some 20 km upstream from the Verwoerd Dam wall almost no sediments are deposited. The Caledon River might look dirtier than the Orange, but the fact is that the Orange River still produces more silt. The Vaal River also looks dirty but contains almost no sediments."

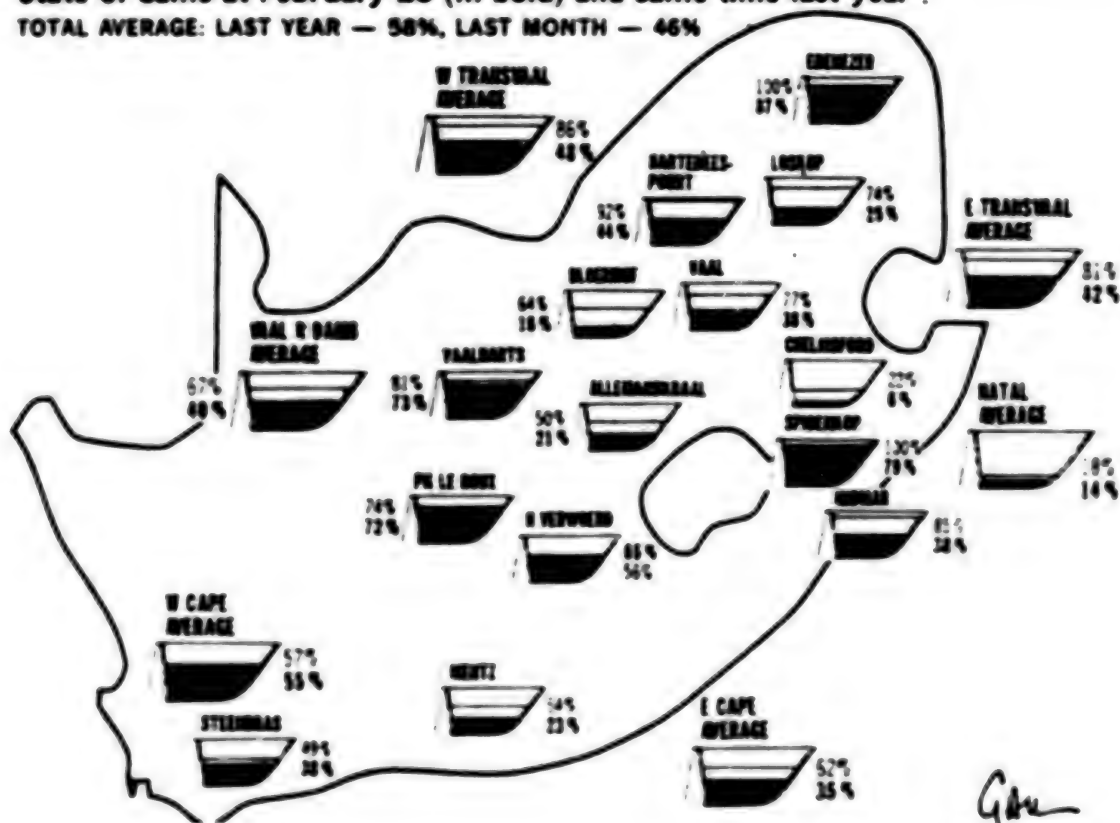
Professor Rooseboom has made an intensive study of the problem of the silting up of the country's largest dam. When the 110 km-long lake will be reduced to half its original water volume by around the year 2060 the height of the dam wall can be increased to give the dam its original capacity again, he says. □

# SOUTH AFRICA

GRAPH SHOWS DRAMATIC DECREASE IN WATER STORAGE

Johannesburg RAND DAILY MAIL in English 4 Mar 83 p 2

[Text] **State of dams at February 28 (in bold) and same time last year .**  
**TOTAL AVERAGE: LAST YEAR — 58%, LAST MONTH — 46%**



CSO: 5000/125

BRIEFS

LEBOA REQUESTS DROUGHT AID--The Leboa government has asked South Africa for nearly 6 million rand worth of drought relief. The Leboa secretary for agriculture, Mr (Boet Fick), says a reply to the request is expected soon. He says Leboa farmers need about 8.5 million rand to keep agriculture in the national state on a sound footing. [Text] [MB041902 Johannesburg Domestic Service in English 1700 GMT 4 Mar 83]

SEVERE DROUGHT, WATER RESTRICTIONS--South Africa is suffering possibly the most severe drought this century, so says Environmental Affairs Minister Sarel Hayward. Hayward said in Cape Town if drastic water restrictions are not imposed, certain dams supplying water to strategic industries and town may experience severe water supply problems by August. He has announced severe restrictions in Natal and the eastern Transvaal. [Text] [MB050600 Umtata Capital Radio in English 1900 GMT 4 Mar 83]

DROUGHT MEASURES IMPOSED--The South African government has instituted drastic restrictions on the use of the water of five major rivers in Natal and the eastern Transvaal amid reports that the country may be in the grip of the worst drought this century. The export of maize has been stopped, as the current harvest may not be large enough to meet the demand, but imports are unlikely because of reserves in hand. The summer grain crop harvested during the past few months is just over 41 percent smaller than last year's, and farmers are heavily in debt. The authorities have made large-scale loans available to keep the industry going, and Lebowa is the latest of the national states to be granted emergency aid. It is to receive \$6 million immediately to combat the effects of the crippling drought. [Text] [MB050739 Johannesburg International Service in English 0630 GMT 5 Feb 83]



**DROUGHT LOWERS MAIZE HARVEST**--Drought has slashed the country's maize harvest this year by more than 60 percent, according to the first official estimate of the crop by the Department of Agriculture. Released in Pretoria yesterday, the estimate stands at 4,700,000 tons--one of the few crops of less than 5,000,000 tons since 1945. This falls almost 2,000,000 tons short of local consumption needs, and even with the 1,300,000 ton carry over from last year the maize board will almost certainly have to import this year. The disastrously small crop will deprive the country of foreign exchange export earnings of between R600-million and R300-million--in addition to the foreign exchange needed to purchase imports. And to import maize inferior in quality to local maize will cost about R240 a ton--about R100 a ton more than the local price. However, the price to the consumer should be unaffected. According to the maize board, the government will probably carry the burden of the extra cost of imported maize. Agricultural economists point out that much of the R900-million borrowed from cooperatives in production loans had been lost. Added to this huge debt is a further R850-million--carried over from previous seasons. Hundreds of farmers have lost their "creditworthiness" and unless generous aid is forthcoming from the state they will be unable to plant the 1983-84 summer crops. [Gerald Reilly] [Text] [MB171003 Johannesburg RAND DAILY MAIL in English 17 Mar 83 p 1]

CSO: 5000/126

CHAIRMAN REPORTS ON PROGRESS OF RSFSR COMMISSION ON NATURAL RESOURCE PROTECTION

Moscow SOVETSKAYA ROSSIYA in Russian 18 Feb 83 p 1

[Article by First Deputy Chairman of the RSFSR Council of Ministers L. B. Yermín: "In Cooperation with Nature"]

[Text] The Commission of the RSFSR Council of Ministers Presidium for Environmental Protection and Efficient Use of Natural Resources began its work last year. The editorial staff asked the commission chairman, First Deputy Chairman of the RSFSR Council of Ministers Lev Borisovich Yermín to discuss its work and the main trends of environmental protection in the RSFSR.

One should note first of all that environmental protection in Russia has its peculiarities. The RSFSR accounts for over 90 percent of water and forest, 75 percent of hydropower resources of the country and the primary portion of mineral reserves. The republic continues to form the largest territorial-production complexes such as the Timano-Pechora, West Siberian, Kansk-Achinsk, Sayansk, South Yakutsk. Construction of BAM [Baykal-Amur Trunkline] predestines a territory of about 1.5 million km<sup>2</sup> for economic development. Intensive development of productive forces in the regions of Siberia and the extreme north creates a number of ecological problems, for nature in these regions has a limited capacity for self-restoration because of the harsh climate. The territory of the RSFSR is represented by other natural-climate zones with all their diverse plant and animal worlds. It also has reservoirs with unique natural complexes like Baykal, Ladoga and Onega Lakes! They require especially thorough attention and concern.

The commission was set up in order to further improve state control of environmental protection and the efficient use of nature. It has been called upon to systematically monitor the fulfillment of the party and government decisions on these questions, the implementation of a unified scientific and technical policy on protection and efficient use of the earth and its resources, water resources, atmospheric air, animal and plant world, reproduction of natural resources and improvement in man's environment. It should be especially stressed that the decisions of the commission on questions within its competence are mandatory for execution by all the ministries and departments of the RSFSR, councils of ministers of the autonomous republics, ispolkoms of the local Soviets of People's Deputies, as well as the organizations, enterprises and institutions, regardless of their departmental affiliation.

The commission meetings examine major problems of the transformation of nature, practical application of environmental protection legislation, observance of ecological requirements in planning territorial-production complexes, construction, reconstruction and operation of industrial, agricultural and other enterprises, land reclamation and hydraulic engineering structures and many other questions. As you see the area of tasks to be solved is fairly broad.

The most important task is to protect the water and air basins from industrial waste pollution. During the past and the beginning of the current five-year plans, there has been considerably faster and larger volumes of construction of works than before. A total of 37.4 million  $m^3$  per day were started up, and 57.8 million  $m^3$  of circulating water supply systems. Together with other measures, this considerably reduced the effluent of untreated water and improved the water quality in the Volga, Oka, Upper and Middle Ob and other rivers. During 1976-1982, units were built for removal and neutralization of harmful substances from the exhaust gases with output of 135.9 million  $m^3$  per hour. Low-waste and waste-free production processes are beginning to be mastered. They not only prevent environmental pollution, but permit more complete utilization of secondary resources and by-products.

Soil protection measures and biological methods of controlling pests and diseases of plants and perennials have been more widely used in agriculture and forestry management. One should include among the positive results the fact that the gap between cutting and replanting of forests has been eliminated on the whole for the RSFSR. As for the animal world, the population of individual game species has also risen.

Over 10 years have passed since the decree of the CPSU Central Committee and the USSR Council of Ministers on measures to prevent contamination of the two largest river basins in Russia, the Volga and Ural was adopted. A lot has been done in this time. Over 500 water protection facilities at industrial enterprises, over 30 treatment works complexes with biological treatment of waste water have been put into operation. But a lot still remains to be done. The allocated capital investments are still not being completely assimilated. Construction of these facilities is going slowly in Kineshma, Murom, Pavlov, Tambov, Engels and certain other cities.

The commission has taken fulfillment of the RSFSR Council of Ministers decree for intensified protection of small rivers under its constant control. SOVETSKAYA ROSSIYA covered their problems many times in its articles, and it is heartening that the public is actively participating in their solution. The results of the work are already apparent.

In the Chuvash ASSR alone, the efforts of the kolkhozes, sovkhoses, water management and forest management organizations planted 16.6 million trees and bushes on the shores of small rivers, ponds and reservoirs, on the animal husbandry complex and farm territory, built 174 dams, 12,500 fence and fascine dams, sowed grass on 6,500 hectares of eroded slopes and executed a number of other anti-erosion measures in 1982.

The Samovets, Kaverin and Shmarov rural councils of the Voronezh, Lipetsk and Tambov Oblasts came up with a good initiative for regulating the water protection zones of the small rivers. This initiative was published in the newspaper SOVETSKAYA ROSSIYA of 13 April 1982 and was widely supported in the Altayskiy Kray, Rostov, Smolensk, Orlov, Chelyabinsk, Kemerovo and a number of other Oblasts. Thus, in the Rostov Oblast alone, public efforts for about 2 million man-days worked to build up the small rivers, ravines, gorges and other environmental protection areas last year.

There are noticeable shifts, but it is still too early to speak about success. Far from all the enterprises, departments, and even entire sectors are fulfilling the set plans. There are frequent cases of violation of the environmental protection legislation, so that there are still shortcomings which are the focus of attention of the commission.

The enterprises of the USSR Ministry of Timber, Pulp and Paper, and Wood Processing Industry, Ministry of the Chemical Industry, USSR Ministry of Ferrous Metallurgy and a number of other ministries and departments are the main polluters of rivers and reservoirs.

There is the danger, and sometimes very great, of polluting the water bodies with run-off from agricultural, animal husbandry complexes, farms and poultry farms. This run-off must go to the fields as organic fertilizer and benefit the harvest.

Since there are many instances of pollution of the rivers and reservoirs with organic fertilizers, the commission has obliged the RSFSR Ministry of Agriculture, RSFSR Ministry of Water Management and the RSFSR Ministry of Public Health jointly with the councils of ministers of the autonomous republics, krayispolkoms and oblispolkoms to verify the observation of manure removal at the large complexes and farms, and to develop measures for efficient use of manure and manure-containing waste water as valuable organic fertilizer.

A lot more needs to be done to protect the air basin. The commission's work includes examination of improvement in the condition of the air basin in the cities of the Murmansk Oblast, Bratsk, Cherepovets and others.

We are concerned about the condition of the agricultural lands. One quarter are exposed to water and wind erosion. The continuing expansion of ravines does considerable damage to farming in many regions.

Industry is indebted to the farmers. Sometimes its workers forget that after obtaining temporary use of the land, they then must return it to the kolkhozes and sovkhozes, and of course, not in the form of dead dumps or gaping quarries, but revitalized for fertility. This is the picture today: despite the increased volumes of recultivation of disrupted lands, the gap between worked and restored areas is still large. Many enterprises do not fulfill the plans for land recultivation. For example, in one of the commission's decisions it is noted that in the 10th Five-Year Plan the enterprises and organizations of the RSFSR Ministry of Highways ruined about 48,000 ha but only recultivated 39,000 ha. This resulted in a further increase in the area of ruined land.

Of course there are many positive examples. If we discuss the wise use of nature and its advantage for the national economy, then it is appropriate to speak about the Zagonskiy experimental-demonstrative forestry farm from the Gorkiy Oblast whose experience was recently approved by the commission.

This enterprise, in addition to successful solution to the main tasks for protection, restoration and use of the lumber resources, focuses a lot of attention on improving the productivity of hunting lands, raising of game birds, development of apiculture, subsidiary agriculture, planting of fruit plantations, as well as laying in of mushrooms, herbs and the use of fodder resources of the forest. This comprehensive trend in agriculture yields good results. The output of gross product from a unit of forest area increased as compared to 1975 almost 4-fold. As for the products of animal husbandry, fur breeding, apiculture and auxiliary use of the forest, it rose during this time by 22-fold and in 1982 was R 3393 from a thousand hectares of forest lands. This is 14-fold greater than for the other forestry farms of the Gorkiy Oblast.

As you can see, our forests have great potentialities and with proper situation can and must become sources for diverse products for the national economy, including for fulfillment of the Food Program.

SOVETSKAYA ROSSIYA has raised the question of preserving the nature complex of Samarskaya Luka, the large bend of Volga at Kuybyshev. This is a popular recreational area of the workers. The picturesque Zhigulevskiy Mountains, many historical monuments, natural sights are located on its territory. Here is one of the oldest preserves in the RSFSR. However in this region there are enterprises for extraction and production of construction materials which are extremely needed by the national economy. They are used not only in the Kuybyshev Oblast, but also at the most important construction sites beyond its borders. We do not have the right to eliminate these resources from the books yet.

The commission has also examined preservation of the Samarskaya Luka nature complex. For efficient use of its resources it has been stipulated that a national natural park be set up on a large part of the territory and measures be taken here to improve its sanctuary and recreational role.

It is suggested that the enterprises for construction materials production which are outside the limits of the national park take additional measures to reduce their adverse effect on the environment. Extraction of minerals will be regulated and reprocessing of mining production wastes will be increased. Recultivation of the already worked sections will be continued at all the quarries and measures will be taken to improve the quality of this work.

The fate of these natural complexes is the focus of earnest attention of the commission.

A number of autonomous republics, krays and oblasts of the RSFSR have recently formed similar commissions. It is thought that creation of these commissions locally will permit a deeper approach to solution to many problems and will have a positive effect on all the environmental protection work.

Speaking about environmental protection work in general, one should state that a complete effect is possible if the actions of the state agencies will be continually reinforced by the initiative of the public and the participation of the broadest circle of people. One of the letters which was recently received by from Comrade Zabólotnikov from Cheboksary is indicative in this sense: "As is known, 5 June is the Universal Environmental Protection Day. I propose that we make this day an All-Union Sunday of volunteer labor [voskresnik] everyone from small to great should do cleanup, planting, and perform other work in streets, in parks, forests, in fields, everywhere."

This appeal deserves attention and support.

I would like to say in conclusion that the interests of the national economy require broad implementation of environmental protection measures, an ecological bent to the country's entire economy, basic and applied research for this purpose, development and introduction of low-waste and waste-free technologies, training of cadres of the necessary specialization, education of people in the spirit of love and prudent attitude towards the wonderful nature of our motherland.

9035

CSO: 5790/62



# ENERGY MINISTRY RESPONDS TO 'IZVESTIYA' ARTICLE

Moscow IZVESTIYA in Russian 30 Jan 83 p 2

/Article: "The Effectiveness of IZVESTIYA" Original article appeared in IZVESTIYA 2 November 1982/

/Text/ The USSR Ministry of Power and Electrification is addressing the article "To Manage Thriftily and Protect Nature" (No 305/306, 1982). The USSR Ministry of Power and Electrification has considered the article and recognizes as fair the critical remarks made against the ministry at the meeting of the preparatory commission of the chamber of the USSR Supreme Soviet for protection of nature and efficient utilization of natural resources.

In implementing the decree of the party and government concerning measures for avoiding pollution of the basins of the Black, Azov, Baltic and Caspian Seas, schedules of water protection measures have been developed. As a result of the introduction of purification installations and the adjustment of existing installations, in 1982 the discharge of polluted water was reduced by 10 million cubic meters.

State plan for the economic and social development of the USSR envisions annual assignments for recultivation of land that has been disturbed during the construction and operation of electric power stations. In 1982 412 hectares were cultivated, including 121.5 hectares of agricultural land. The planned assignment for 1983 for the branch envisions the recultivation of 675 hectares.

The question of the fulfillment by the ministry's enterprises and organizations of assignments for the construction of water protection facilities was considered by the board of the ministry. The board made it incumbent on managers of subdivisions to take measures for unconditional fulfillment of the decrees of directive agencies for environmental protection, to bring charges against parties guilty of failing to meet the deadlines for the startup of environmental protection facilities, and to step up control over the course of construction and installation work at these facilities.

In 1982 preparatory work was started for constructing an experimental industrial installation for purifying smoke gases of sulphur anhydride at the Dorogobuzhskaya GRES with a capacity of a million cubic meters of gas per hour. In 1983 the USSR Gosplan is taking out a permit for the construction of this installation with an overall estimated cost of 21 million rubles. The developer of the technology and equipment is the Ministry of Chemical and Petroleum Machine Building. It is to be introduced in 1985.



In 1982 construction was completed on the head experimental industrial installation for purifying smoke gases of nitrogen and sulphur oxides at the Moldavskaya GRES, and startup and adjustment work has begun.

The USSR Ministry of Power and Electrification is also taking additional measures in order to solve problems of protecting nature. A comprehensive scientific and technical program has been established for the period of 1981-1985. At the present time measures are being developed for protecting nature during the period up to 1990, according to the deputy minister, F. Sapozhnikov.

11772

CSO: 5000/59

## TAJIKISTAN HIT BY 'FORCE 7' EARTHQUAKE

### 'PRAVDA' Gives Details

PM021241 Moscow PRAVDA in Russian 28 Feb 83 Second Edition p 8

[TASS Report: "Earthquake in Tajikistan"]

[Text] Dushanbe, 27 Feb -- An earthquake occurred 26 February at 2308 Moscow time on the territory of Tajikistan. Its epicenter was situated some 180 kilometers northeast of Dushanbe in the vicinity of the settlement of Garm. Here the force of the quake reached 6-7 points. According to data recorded by the Dushanbe Seismological Service, the force of the quake registered 3 points in the capital and also in Nurek and Fayzabad, and 2-3 points in Khorog. Houses and administrative buildings near the epicenter suffered damage. There are no casualties. Commissions to eradicate the damage caused by the earthquake have been set up on the spot.

### 'TRUD' Report

PM041013 Moscow TRUD in Russian 2 Mar 83 p 4

[Yu. Krasnopol'skiy report: "Force 7 in the Pamir Foothills"]

[Text] Tajik SSR [no date given] -- The worst did not happen: People did not suffer. But the earth tremor which during one recent night stirred the inhabitants of the ravine center of Garm and neighboring settlements from their beds caused not inconsiderable alarm. Nature was not trifling -- Force 7 is a serious matter.

The next morning, after the sun had risen, the consequences of the night of alarm became clear: falling plaster had exposed cracks in the walls of the settlement's residential dwellings and administrative buildings and in places the water and heating supply was interrupted. Here and there power supply and telephone communications were cut off. Deep cracks crisscrossed the roads and certain sections had even subsided. In the mountain regions landslides and avalanches had taken place. All of this became obvious, I reiterate, only in the morning.

But the work of organizing emergency help for the inhabitants of the regions which had suffered had already begun at night when, immediately after the earth tremor had fallen to force 3, the signal about the natural disaster came through to the capital. The republic is in constant readiness for this. It is known that Tajikistan is noted for high seismic activity. But to forecast reliably when, where and with what force the elements will suddenly manifest themselves is an uncommonly complex matter. Therefore there always exists a state of readiness to repel their onslaught and to take the requisite measures.

A.D. Zadabayev, secretary of the Tajik Communist Party Central Committee, who is head of the republic governmental commission for extending immediate aid to any population suffering from a natural disaster, relates: "The primary and main task was to provide accommodations for people whose homes had been damaged by the earth tremor. After all, Garm is the gateway to the Pamirs, and natural conditions there at this time of year are quite severe. The local party, soviet and trade union organs and labor collectives displayed great efficiency and organization. Without waiting for outside assistance, they set about resettling the victims in a number of administrative buildings and in neighboring kolkhoses and sovkholes. No one ended up without a roof over his head. Within a short period the organization of feeding was in hand and the power supply and communications restored.

Volunteers from neighboring regions immediately headed for Garm to take part in restoring the settlement. Columns of trucks laden with construction materials, fuel, food and essential items left Dushanbe's truck enterprises and are now forcing their way along the snow-covered mountain routes to Garm. Portable accommodation and other essential equipment will soon begin arriving.

The settlement continues to have an intense labor existence, even more intense than is usually the case, because now that an organized response to the earthquake has been made, it is essential to work out the scale of the damage caused and restore what has been destroyed in the shortest time possible. And despite the treachery of the elements we must successfully fulfill the social and economic tasks which confront the rayon's working people.

Signs of the disaster are still visible in Garm. But the stores, canteens, schools and enterprises are already working. Life is returning to its usual pattern. The people did not falter when confronted by the force of nature.

SP: 5000 66

## PROTECTION OF LENINGRAD AGAINST FLOODS DISCUSSED

Moscow PRAVDA in Russian 17 Feb 83 p 6

[Article by V. Gerasimov (Leningrad): "The Baltic Belt"]

[Text] "I was alarmed and disturbed when I read announcements in the newspaper and saw on television the pictures of the recent floods in Leningrad--a city which is especially dear to Soviet people. I would like to know what is being done today to protect Leningrad from flooding, and how the plan for construction of the immense hydraulic engineering complex in the Finnish Gulf is being implemented. I think that everyone would like to know about this."

N. Nikolayenko, Kiev

The 251st flood since the founding of the city caused our reader to turn to our newspaper. While the letter was going from Kiev to Moscow and then to Leningrad the elements managed to disrupt the city three more times. Last fall and this winter turned out to be especially generous with such "surprises." The last time the wind was an hour late in taking the direction which strengthens the threatening waves. And it was only because of this that the water in the rivers and canals did not manage to reach the critical mark. Keeping the piles of broken-up ice in the coastal part of the city, the Neva subsided without managing to cause harm. The preceding flooding, alas, did not pass without appreciable damage to the economy and the city management. Only enterprisingness and prompt notification of the population of the forthcoming danger along with well-arranged actions of Leningrad citizens helped to prevent more damage. Nonetheless it is significant every time.

Devastating floods have been known throughout the history of the city on the Neva. One was the attack of the elements in 1777 when the water rose to 310 centimeters above the ordinary level, and in November 1824 it was even worse--375 centimeters. And here is the more recent chronicle: 1924--369 centimeters, 1955--282 centimeters (a considerable part of the territory of the city was flooded). Incidentally the 1955 flooding was the first one the weather forecasters were able to predict. Then the city dwellers managed to prepare to fight the elements. Now announcements about disasters that threaten the city are made reliably several hours ahead of time. But all this only makes it possible to reduce the damage, but not to avoid it altogether.

In principle the calculations of specialists do not rule out a rising of the water of the Neva to more than 5 meters above ordinary. If this were to happen 12 rayons of the city would be flooded as well as historical monuments, enterprises and electric power stations . . . . They think that such a disaster could happen to a city only once in every 10,000 years. But scientists are not able to say precisely which day in this immense time segment will be fatal. Flooding with a 3-meter rise of the water is quite possible at any moment.

This is why the problem of protecting Leningrad from attacks by the sea is so important. It is now being resolved at increasing rates. Let us remind the readers of the essence of the problem. According to the plan in whose development more than 50 scientific and planning organizations participated, the Finnish Gulf from the village of Gorskaya on the north bank through Kotlin Island to the Bronk station near Lomonosov (south bank) there will be rock and earth dams with an overall length of 25.4 kilometers and a breadth of 35 meters. They will rise 8 meters over the surface of the water. Along the crest of the structures there will be a 6-lane highway. Kronshtadt will cease to be an island city.

In order for ships to move freely into Leningrad ports, two "gates" will be made in the dam--one 200 and one 110 meters wide. In order to maintain the normal water exchange in the water area that is separated from the Baltic and to allow the Neva to flow into the Gulf, it will be necessary to construct 64 drain openings. As soon as there is a signal of an approaching threatening wave, on a command from the central control board, the massive steel gates move out of their chambers. Within a half hour they will completely close the sea off from the Neva firth. Nor will ice be an impediment for the 1,000-ton gates: with their weight they will crush them.

"An immense volume of work will have to be done," says the chief of the Leningradenergoenergostroy construction administration of the USSR Ministry of Power and Electrification, Yu. Sevenard. "In order to construct the protective structures it will be necessary to pour 2.5 million cubic meters of concrete and reinforced concrete, to construct rock and earth fills in 35 million cubic meters, and to install 50,000 tons of metal structures. Work on such a large project required the creation of a construction industry and mechanization base, the organization of new mines for extracting rock, sand and gravel, and the creation of rail and water routes and highways for delivering cargo. Even now 3,000 people are working on the construction of the Leningrad "sea shield" and in the future when the work reaches its apogee, about 10,000 workers and specialists will be employed here. The construction site needs machine operators, welders, fitters, concrete workers and hydraulic engineers . . . ."

In October 1980 the first rock was thrown into the water of the Finnish Gulf near Gorskaya, with the inscription "We shall protect Leningrad from floods!" Now the fill area into which large dump trucks are bringing rock to construct the dams extends more than 2 kilometers from the bank. The work is being done by 3 mechanized complexes headed by V. Kozhukharev, G. Pervutinskiy and V. Klyuchnikov. The brigade of A. Molodkin is moving from the island to meet

them. It has laid the first half kilometer. The offensive is also developing in the southern direction--almost a kilometer from Kotlin in the direction of Lomonosov. In spite of the freezing weather that jammed the Gulf with ice, the work has not ceased for one day. By the end of next year the builders intend to join the bank to the island with a land route. This will make it possible to develop the attack on the elements.

A landing troop has been placed right where the builders are to meet, directly in the sea. It is constructing . . . a large bridge. One cannot immediately understand why this structure was necessary so far from the bank. But it is precisely this decision that will accelerate the creation of the hydraulic engineering complex. The fact is that over the structures through which the water will pass the highway will go along an ordinary bridge instead of a drawbridge, and under the shipping channels there will be tunnels on the bottom of the Gulf. It will require a good deal of time and labor to construct them. Therefore, in order to rapidly arrange transportation to the island, in the neighborhood of the northern channel for coastal ships, which will have to be closed off temporarily, a bridge almost 20 meters high is being constructed over the future bypass channel. When it has done its duty it will be dismantled.

The unusual nature of the project also requires extraordinary engineering decisions. A deep water channel is being constructed from the north channel to the bank, where docks are being constructed for large cargo ships. And many of the materials and elements for the hydraulic engineering complex are to be delivered by water--this is more advantageous and reliable. But for the time being quite different work is going on in the drained pit of the future cargo port. An area has been organized for manufacturing the floating elements of one of the water passage structures. As soon as it is assembled the pit will be flooded with water. The heavy elements will be "floated," they will be towed to the intended place and placed on the bottom supports.

Specialists think that it will be necessary to conduct many bold experiments like this. Even before the completion of the construction the protective structures must become a reliable barrier for the elements. Even when they have been raised only 3 meters over the Gulf they will be able to hold back an angry wave which is capable of causing flooding in the city with a watermark of 2.5 meters above normal.

In the sea routes it is marked--and the hydraulic engineers, by examining the bottom of the Gulf, have been convinced of this with their own eyes: near the axis of the protective structure, extending along the bottom are long rows of artificial origin--crib work made of stone. They were laid during Peter's time and, by passing among the forts, they served as an underwater obstacle to unfriendly fleets.

"In these rows are about 4 million cubic meters of rock, and we need 5 million for the construction site," continues Yu. Sevenard. "Now the rocks of the fill are only an impediment to the construction workers. If the administration receives help with providing the construction site with floating excavators and special barges, it will be possible to raise some of the rock placed on the



bottom by our ancestors and use it for constructing the dams. Although the average depth of the Gulf in the zone of the protective structures is only 2.9 meters and only in places does it reach 10, it is not a difficult task to carry out. But it is economically expedient.

The reliability of the objects and a reduction of the time periods are the decisive conditions for the competition of the collectives for constructing the hydraulic engineering complex. Incidentally, there is another thing. We are constantly reminded of this also. In the stage of selecting the variant, opponents expressed fear: will the protective structures not worsen the sanitary condition of the water areas that are not close to the sea? The doubts are quite explicable. Questions of environmental protection, especially in an area adjacent to a large city, are extremely crucial. Numerous natural, theoretical and laboratory research projects of the peculiarities of the water conditions of the Neva and the Gulf, and a test of the calculations with models showed that there is no cause for alarm. Nonetheless hydrauligists are continuing their research. In a special hall with an area of more than 10,000 square meters a model of the Neva delta and the Neva firth will be created which will be one-fiftieth of the natural size. In it scientists, imitating various situations, will repeatedly check their conclusions and recommendations, and refine them so that everything will be taken into account when forming the "sea shield" for Leningrad. Within a couple of years it will become an insurmountable obstacle on the path of the destructive elements.

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CSO: 5000/57



# COMPENSATION FOR INDUSTRIAL CONTAMINATION OF WATER DISCUSSED

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 1, Jan 83 p 18

[Article by I. Gavrilov, Senior Economist of the Belorussian NIIPU of the Belorussian SSR Gosplan]

[Text] Water used by industry is contaminated by harmful admixtures, loses its original qualities and becomes dangerous for the environment. How can we reduce the dumping of contaminated sewage? Many economists believe that it can be done only by establishing an appropriate fee.

Compensation for dumping contaminated water into the sewer system has been established recently. Its rates differ greatly, and within the limits of one economic region vary from 6 to 7 kopecks per one cubic meter of sewage water. However, not all contaminated sewage water is discharged into sewer systems. For example, the Gorodeyskiy Sugar Plant dumps into the Neman River 8683 cubic meters of sewage water every day. The content of harmful substances in it is sometimes several times higher than the maximum permissible norms. Therefore, it has become urgently necessary to establish a compensation fee for dumping contaminated sewage water into open water reservoirs. However, there is no clear answer to the questions of what it should be and from what sources it should be paid.

Let us try to examine this problem and start with the source of the compensation fee. In our opinion, it can only be the production development fund. It is most expedient to use this fund for compensating the damages caused by the contamination of the environment. When an enterprise is compelled to pay from this fund, it will have no other choice but to take measures for purifying its contaminated sewage water. Otherwise, the funds for the improvement of the equipment and technology will be diminishing considerably, and this will jeopardize the fulfillment of constantly increasing production plans.

Let us now discuss the rate of compensation. Analysis shows that compensation for polluting water reservoirs will play its role in environmental protection only if it will be higher than the expenditures on sewage treatment. It is evident that it has to be at least 10% higher. However, such compensation does not depend on the level of contamination and, consequently, on the amount of the damage done. On the other hand, it is necessary to take into account the amount of damage, since the purpose of the compensation is to lower the negative effect of contamination on the environment. In our opinion, the following will be an optimal variant: if the concentration of polluting substances in the sewage dumped into open water reservoirs

is one and a half times higher than the norm, the rate of compensation must exceed the expenditures on the sewage treatment by 10%, but must not be more than 25% of the total production development fund; when the concentration of polluting substances is 1.6-2 times higher than the permissible concentration, the compensation fee must be 20% higher than the treatment costs, but not over 40% of the production development fund; however, if the concentration of polluting substances is more than two times higher than the permissible level, the fee for the dumped sewage must be 40% higher than the treatment costs and can amount to one half of the production development fund.

In conclusion, let us discuss the following aspect. As is known, the production development fund depends on the amount of profit. But what should be done if an enterprise is not profitable? It is particularly characteristic of newly introduced capacities and plants which are developing new types of industrial production on a large scale. It seems that in this case all efforts must be directed to stimulating the timely use of centralized capital investments allotted for water protection purposes. In this case, administrative and organizational methods of environmental control become important, as well as the organization of moral and material incentives for workers for successful fulfillment of environmental protection plans, including those for the treatment of polluted sewage. Such incentives must not depend on the fulfillment of the production tasks by the enterprises. Fulfillment of jobs in this area must be taken into consideration also in summing up the results of socialist competitions.

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CSO: 5000/43

# SURFACTANT-FOAMED LIQUID INDUSTRIAL WASTES BURNED

Moscow IZVESTIYA in Russian 15 Jan 83 p 3

[Article by V. Treskov under the heading "This Is Interesting": "Water Is... Burning"]

[Text] Can water be ignited? Scientists at Moscow Power Engineering Institute answer in the affirmative. Not only can, but even must, they think. Power engineers have developed a new method of treating liquids used in production.

The problem of treating industrial liquid wastes is quite complex. How does one rid liquids of wastes from working nonferrous metals, various slags, emulsions and resins? Considerable liquid waste of this kind is accumulated in production. What to do with it? It can't be thrown out into the rivers or the lakes or even the sewage system.

Liquid wastes are ordinarily put through special treatment plants at enterprises. This is very expensive and, unfortunately, far from always highly effective. Hazardous substances contained in wastes are sometimes not fully neutralized. The method proposed by MPEI scientists is noted for its safety and simplicity.

"Used water can simply be burned off, like brushwood," says institute docent P. Edym, author of this work. "Yes, it's the water that is ignited. We can do this if surfactants are added to the water and they form a flammable foam. Natural gas must be added to the water to froth the liquid. The foam, consisting of bubbles of flammable gas and scum, readily burns, along with all the hazardous substances, leaving practically no residue. The problem of wastes can thus be solved.

The new offspring of the scientists has thus far taken only its first steps at enterprises. But experience has already shown its effectiveness. The cost of neutralizing liquids using the new method is two to three times cheaper than existing heat-treatment methods. The work of MPEI scientists has been recognized as an invention and is being introduced at enterprises.

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CSO: 5000/56

# ROSTOV OBKOM CALLS FOR DON CLEAN UP

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Feb 83 p 3

[Article by M. Teslya, secretary of the Rostov obkom, under the heading "Man and Nature": "Pure Springs"]

[Text] Beginning at springs near Novomoskovsk in Tula Oblast, the Don absorbs along its nearly 2,000 kilometers more than 5,000 tributaries. Quite a few, it would seem. Nonetheless, the water deficit on the lower Don is nearly four cubic kilometers. This is approximately one-fifth of its total daily consumption to meet various national economic needs. These proportions require careful consideration.

Specialists have carefully estimated how much water goes where. Without going into detail, let us note that it is by no means always used efficiently. Quite a lot of the purest Don water is spent diluting the contaminated wastes of industrial enterprises. This is clearly extravagant. We talk a lot about this, but what are we doing about it? How are the practical problems of water supply at enterprises, in transport and construction, being solved? How are natural resources being protected? Are they being used thriftily? What needs to be done to augment them? These questions have been examined by the oblast party committee and oblispolkom which have, at the suggestion of scientists and the community, declared this year environmental protection year on the Don. We have set ourselves the concrete goal of increasing environmental protection work, generalizing and disseminating the best experience and introducing the entire oblast population to the concept of conserving natural resources.

Specially created oblast, city and rayon organizing committees have done much analytical, propaganda and organizing work, on which some results are already available. As compared with previous years, considerably more water protection is being done. For the first time in many years, the annual capital investment plan for construction of the second line of the Rostov [sewage] treatment plant has been met. Construction of similar facilities in Taganrog is complete. A recirculating water supply system has been introduced at many enterprises; "Rostovugol'" association mines have created facilities to treat 3,700 cubic meters of mine water.

The air is cleaner. New gas and dust removal facilities have been introduced and old ones renovated at the Nesvetay GRES, Novochoerkassk Electrode Plant, Rostov Glass Plant and a number of other enterprises. In just one year, the levels

of hazardous substances in the air basins of such cities as Rostov, Novocherkassk and Volgogradsk have been reduced 1.5- to two-fold.

New green belts have been created around cities and settlements. More than a million trees and shrubs have been planted, game refuges have been established, and stocks of valuable species of fish have been stabilized and even increased in the Don.

But perhaps one of the most important results has been those shifts which have occurred in people's attitude towards nature. Our oblast has, for example, the Zhuravskaya bend as one of its natural boundaries. Everything seems ordinary here at first glance: forest, water. But a closer look reveals fairy-tale scenes. Rabbits bound, moose migrate through from neighboring regions, pheasants cross the clearings like chickens in a barnyard. There are dappled deer and roe deer, marmots and squirrels. Rare birds like the falcon, horned owl and even birds in the "Red Book of Thrushes and Bustards" [Krasnaya Kniga Drozdy i Strepety] nest here.

This isolated terrain feature is under the care of "Pops Adobe," as B. Nechayev is called. He is director of the Nizhnokundryuchenskiy Farm, a biologist and holder of the "Badge of Honor" order. Loving his work, he has fired up many others. His first helpers were Pioneers and Komsomol members who made birdhouses, gathered food for the rabbits and helped trap animals and birds for resettlement to preserves. Schoolchildren recently asked the Pioneers and Komsomol members to sponsor oblast springs.

This call by young nature-lovers is finding increasingly broad support and response. Local soviets, industrial collectives and rural laborers are coming to the aid of these schoolchildren. This seems to be a very valuable primordial link in the chain of displaying civil interest in the fate of our native region, an interest which has resulted in active efforts by the residents of a number of larger settlements to clean up small rivers and plant vegetation along their banks. By uniting their efforts, people are restoring life to the streams of Biliyoy Nevvetay, Tuzlov and others. Various organizations, enterprises and agroindustrial enterprises are participating in this work.

Environmental protection has been raised to the level of state policy here and is supported by the force of law. But this force must not be overestimated. The law is delicate, but it does not regulate the qualities of the spirit. A love of nature and a careful, thrifty attitude, rather than a coldly indifferent one, towards it must be developed. And we are convinced this development must begin in the family and school. In fact, the first lessons in thinking in nature and in nature will become decisive and pivotal in one's whole subsequent attitude towards the environment.

In and of itself, beauty is no salvation from callousness, no panacea for the corrosive plague of unspirituality. Nature is not deceived by bombastic exclamations like "Ooh, how pretty!" Nature loves work and concern. And it is only in this condition that it will teach. This is the thought we have made part of our educational process. This past year, much has been done, but it is of course just a springboard, the start of much work that lies ahead.



As explained, for example, that pupils in our schools sometimes know more about exotic, distant countries, about elephants and dolphins, than about their own home area, about the birds and animals with whom they live. This means we need to think about the orientation of, for example, those television programs on the lessons of nature. They are run, true, under a good slogan: "Love and Know, Actively Protect Nature in Your Native Region!" But these lessons obviously have yet to do much to touch our feelings or arouse us to action. The example of our elders is very important here. A young person does not learn anything from a parent, leader or specialist who, while moved by nature on a Sunday stroll, closes his eyes to the discharge of hazardous gases into the atmosphere or untreated wastewater into the river on workdays.

Agencies of the court, procurator's office and people's control, environment monitoring departments and public agencies to inspect the natural community have recently intensified their monitoring of compliance with environmental protection legislation. Quite harsh steps are being taken against violators. Thus, the procurator's office in Azov brought criminal charges against V. Nazarov, chief of the construction administration No 3 of the "Spetsyazhstroy" trust, and Yegor A. Pudeyan, who broke an electric power cable to the city treatment plants for carelessness, resulting in untreated wastewater reaching the Don. The Azov people's court sentenced A. Pudeyan to six months and V. Nazarov to four months of corrective work, with 15 percent of their wages withheld to the state.

There are quite a few such examples. However, it is quite obvious that punitive sanctions alone will not solve the problem. The inner demand that each leader, specialist and worker consider the implementation of environmental protection measures a top-priority personal task is important. At the same time, there are frequent repeated instances of mismanagement of and indifference to the environment.

The state anticipates the allocation of more than 70 million rubles in capital investment for environmental protection in 1983. But the problem is that construction organizations often treat this work as being of secondary importance. Environmental protection measures are being carried out very slowly, due to the slacking of leaders of a number of enterprises such as the Tagan Rog Metallurgical Plant and "Khalitvasei'mash" plant. This also occurs because this indicator is not yet always considered a basic one when summing up competition results. Ministries and departments do not question enterprises about environmental protection projects.

The Azov party committee is focusing the attention of party gorkoms and raykoms and on local Soviet agencies on being more demanding that programs for developing low-waste technologies and environmental protection, for introducing promising scientific developments, be implemented unswervingly. It must be said that our scientists are doing much to solve the problems associated with the intelligent use of resources. For example, they are developing a unique automated system to monitor water pollution. Its station will track the condition of the rivers around the clock. The system is capable of predicting water composition and concentration of changes in hydrology and water consumption. The development of a model to simulate the Sea of Azov ecosystem is of great practical importance.

We at Zhuravskaya bend have good forests, the purest springs and outstanding rivers and ponds. But we are confident that all this can be increased if we are able in each family and each collective to set up educational work at the proper level. If we overcome all inertia in economic activity and are thrifty managers of natural resources.

11051

CSJ: 5702/61



## BRIEFS

**WASTE WATER FOR IRRIGATION**--The All-Union Scientific Research Institute of Agricultural Utilization of Wastewaters has developed a method of purifying household wastewater in biological ponds before they are utilized for irrigation. The new method makes it possible to considerably accelerate the decontamination of wastewaters. The greatest economic effect is produced by cultivating perennial grasses on fields that are irrigated with this water. The crop increases several fold. The experience of farms and also research confirmed the great prospects for the utilization of wastewaters for irrigation. This is a path to increasing the productivity of agricultural land, protecting bodies of water from pollution and reducing the expenditure of pure water. [Text/ [Moscow SEL'SKAYA ZHIZN' in Russian 13 Jan 83 p 2/ 11772

**PROCESSING INDUSTRIAL WASTEWATER**--Wastes from galvanizing and the paint industry can be successfully used as effective reagents for purifying wastewater from industrial enterprises. Specialists of the Brest electromechanical plant came to this conclusion. With the help of solutions that had been used they not only removed heavy metals and paint residuals from utilized water, but also sharply reduced the salt content in it. After this it was suitable for secondary consumption for technical purposes. The metal- and energy-intensiveness of new technological lines that have been developed by plant specialists has decreased to one-fourth the previous level, and the expenditure of reagents that are in short supply--almost to one-ninth. And while previously wastes containing paint could be decontaminated only by diluting them, which required more than 10.5 billion cubic meters of river water each year, now there is no longer a need for this. An experiment that was conducted opened up broad possibilities of introducing waste free technology for processing wastes and creating a waste free system of water supply for the enterprise. The annual economic effect from the introduction of this technology at the Brest electromechanical plant amounts to about 700,000 rubles. On the basis of the first results they are now developing recommendations for other enterprises of the branch. [Text/ [Minsk SOVIETSKAYA BELORUSSIYA in Russian 13 Jan 83 p 1/ 11772

**ATMOSPHERIC POLLUTION IN ARCTIC**--Moscow--The atmosphere of the Arctic has been more polluted than the Antarctic with gas compounds of industrial origin. As measurements of scientists of the Institute of Atmospheric Physics of the USSR Academy of Sciences and the Arctic and Antarctic Scientific Research Institute showed, the percentage content of carbon monoxide in the region of the Arctic peninsula of Zvezdov was equal to the level of pollution of the latitudes over which the so-called "pollution belt" exists. "The results that were

obtained were unexpected even for us," says the laboratory chief of the Institute of Atmospheric Physics, professor V. Dianov-Klovov. "For up to that time our calculations of the pollution of the planet's atmosphere were based on figures for the Antarctic. It was thought that because of the symmetry the content of carbon monoxide in the Arctic should decrease as the North Pole is approached, just as it does in the Antarctic toward the South Pole. In fact it turned out that right up to the 80th degree north latitude the concentration of carbon monoxide was equal to the level of pollution at latitudes of 40-50 degrees in the northern hemisphere." The paradox can be explained by the more intensive circular movement of the air masses around the Antarctic. Powerful atmospheric whirlwinds which form a kind of ring around the southern continent slow up the movement of polluted continental air currents here. The data from the measurements on the Zhokhov peninsula in the Arctic make it possible for scientists to refine the model of the distribution of carbon monoxide in the planet's atmosphere that they have created, which is extremely important for evaluating possible changes in the climate. /Text/ /Moscow SOVETSKAYA ROSSIYA in Russian 9 Jan '83 p 6/ 11772

US91 510059

## IMPROVEMENT IN AIR QUALITY IN VIENNA NOTED

Vienna WIENER ZEITUNG in German 11 Feb 83 p 7

[Report: "Vienna Air Being Improved--Plan for Reducing SO<sub>2</sub> Emissions--By 1990 the Air Will Be as Good as Before Industrialization"]

[Text] By 1987 the sulfur dioxide emissions of Vienna's caloric power plants will drop to less than half of what they were in 1980, and by 1990-1991 to no more than 15 percent of what they were in 1980. This was stated Wednesday /9 February/ evening by Mayor Gratz at a press conference in the Vienna City Hall in which Municipal Councilors Fritz Hofmann and Peter Schieder participated as well.

Gratz emphasized that these efforts had been preceded by instructions from him to look into optimum desulfurization of Vienna power plants while establishing at the same time to what extent the Vienna power plants in fact shared in polluting the air of Vienna.

In consequence of this, the Vienna municipal works, said Municipal Councilor Hofmann, had initiated a program giving priority to equipping the future new power plant bloc of the power plants with power-heat coupling and a technologically optimal flue gas-desulfurization installation, as well as increased use of natural gas, with far less emission, in lieu of fuel oil in the existing power plants, and an increase in the share of compound power, and thus of hydropower, in the Vienna power supply. Priority is also being attached to participation in the future Danube damming stages as well as to the installation of power-heat coupling in the Leopoldau gas turbine works. In addition the Vienna power plants through the on-going increasing remote-heat supply from power-heat couplings are making a further decisive contribution to lessening the adverse effect on the environment.

Municipal Councilor Schieder emphasized that the expansion of remote-heat supply with energy-saving heat-power couplings was in fact one of the most important measures to protect the environment in that this made it possible to replace home-heating and industrial installations highly injurious to the environment.

Schieder said that the just submitted air improvement program was the biggest ever executed by a city of a million or more inhabitants. Normally it was

considered a positive thing if the air quality in cities did not deteriorate. In Vienna it was going to improve threefold. A quality of air such as would be attained in Vienna in the early 1990's existed last before the phase of industrialization, he said. He stressed the fact that even if things developed unfavorably, there was no danger of smog in Vienna.

A further problem, Municipal Councilor Schieder said in conclusion, was the car emission gases in the city. The emission of nitrogen oxides, however, was not a problem to be solved by Austria alone; rather it was a question of the internal combustion engine as such. What had to be done was to appeal to the manufacturers of automobiles.

8790

CSO: 5000/2550

CDU, SPD ENVIRONMENTAL POLICY COMPARED

Frankfurt/Main FRANKFURTER ALLGEMEINE in German 22 Feb 83 p 10

/Article by Klaus Broichhausen: "Who Is the Better Protector of the Environment?"

/Text/ "This time the Bavarians are on the left. That needs to be noted." So said North Rhine-Westphalian Minister President Rau, president of the Bundesrat, at the latest meeting of the second chamber--amazed that the Bavarian Land government called for the strictest possible regulations on keeping the air clean. Anxious about their forests, the Bavarians are fighting for environmental obligations that --if applied abruptly--are bound to have serious consequences for economic development. Other Land governments warned of this danger, not least SPD politicians from industrial conurbations.

Business fears that it will be far harder to obtain approval for industrial plants in the wake of the complex "Technical Instruction for Keeping the Air Clean" (TA--Air), already enacted by the Bundesrat. The Laender have approved all pertinent items in the proposals submitted by the Federal Government; in fact they tightened them further by additional provisions relating to the threat of sulfur dioxide. From the standpoint of the German Industrial and Trade Association, these amount to "exaggerated environmental control" such as had prevailed once before, at the time of the SPD/FDP coalition. None of the objections impressed Federal Minister Zimmermann (CSU), in charge of environmental control.

With Laender backing, Zimmermann announced further restrictions in regard to environmental regulations, specifically new directives to check air pollutants. "I cannot wait until the last tree keels over," said Zimmermann. Although not all the causes of dying forests had been discovered, he had to act and take steps with regard to the prime suspect--sulfur dioxide. Proceeding under Zimmermann's direction, the CDU/CSU-FDP coalition is adopting environmental resolutions repeatedly postponed by the former coalition partners. Federal Chancellor Schmidt had little concern for the environment. Much time elapsed until a feasible government draft for the TA-Air emerged because FDP ministers Baum and Lambsdorff opposed one another--the one pre-occupied with the ecology, the other with economics. Not until just before the change of government--on 1 September 1982--did the cabinet decide on "ecological standard values." The most notable item in the cabinet decision was the proposal to restrict the emission of sulfur dioxide from power plants to 400 milligram per cubic meter by issuing a large furnace decree. Zimmermann has taken over precisely this limit. The SPD is now lagging behind by merely promising in its election program that it would promptly enact a large furnace decree "based on the social-liberal government resolutions of 1 September 1982."

Government environmental decisions since the change-over have embarrassed the SPD. Their election program claims that "the right coalition wishes to change environmental policy also," relegates it "to a secondary issue." That claim has certainly been disproved. Still, though the SPD opposition has lost points in the election campaign with regard to the topic of environmental control, it insists on presenting itself as the better champion of the environment. It keeps in close contact with the Greens.

One section of the SPD election program deals with the environment and energy. The section is headed: "To seek reconciliation with nature and preserve the environment." This wording was chosen by Essen Professor Meyer-Abich, a natural philosopher, who is chancellor candidate Vogel's adviser on environmental, energy and research policies. One must agree with Meyer-Abich's view that an industrial country such as the Federal Republic needs to seek reconciliation with nature. Others express the same view in a somewhat different manner: We should find a balance between the exigencies of the ecology and of economics. Also undisputed is Meyer-Abich's assertion that conservation must needs be the first commandment in the handling of raw materials and energy. It has been common knowledge for quite some time that a provident environmental policy represents one of the conditions of long-term economic stability. Unless we better budget such vital goods as energy and raw materials, water and air, land and soil, we deprive our industrial country of the bases of prosperity and growth.

Unfortunately unaffiliated Meyer-Abich and the SPD advised by him draw the wrong conclusions from this appreciation. They take an unduly simplistic view of this country's energy supplies; they underestimate the hazards. These latter continue, even though oil is superabundant just now. Meyer-Abich and the SPD overestimate the potential for energy conservation and energy production by solar and wind power. Energy conservation is to be compulsory. The election program calls for resolute "efforts to better utilize and conserve energy (consonant with the recommendations by the German Bundestag commission of inquiry)." The election program passes over in silence the fact that the majority of the Bundestag commission of inquiry recommended a plethora of orders and bans, obligations and levies: A perfect energy dictatorship, an energy conservation state.

Meyer-Abich's central energy doctrine amounts to this: In regard to energy policy, conservation is the only source of energy compatible with the environment. It involves neither air pollution nor overhead transmission lines, risks neither climatic upheavals nor disasters. With this wording Meyer-Abich refers back to a slogan issued by the Federal Ministry for Economics: "Energy conservation is our best energy source." However, both these statements are false. Energy conservation cannot be an energy "source." Before energy can be conserved, it must be produced and converted. Energy conservation is just as little a source of energy as fasting is a source of nutrition, says Barthelt, board chairman of Kraftwerk Union.

In contrast to Meyer-Abich, the Federal Ministry for Economics does not rely on energy conservation. To be sure, the ministry does believe in conservation. At the same time, though, it maintains that the available energy must be used in the proper proportions, provided such utilization is justifiable in terms of technical safety precautions. Nuclear energy therefore has a role in energy supply, in addition to domestic coal. Meyer-Abich does not reject nuclear energy but he is ready to tolerate it only if subject to considerable restrictions.

Evidently no party or supply firm does that. In a densely populated country anyone acting responsibly in energy matters can obviously agree the expansion of nuclear energy only within quite specific limits. That is why the third forward projection of the energy program (cosigned by the SPD--then the party of government) states that nuclear energy is vital for the base load of production, for 24-hour operation.

Current SPD election slogans assert that the expansion of nuclear energy sidelines coal and causes the miners to lose their jobs. The SPD evidently intends this nuclear energy stance to make up the ground recently lost in the matter of environmental policies.

At the Dortmund SPD election congress chancellor candidate Vogel earned the loudest applause when he said it would have been better to use the money spent on the fast breeder reactor to combat sulfur dioxide emissions and acid rain. Vogel must be reminded that it was Hamburg's mayor von Dohnanyi, then SPD research minister, who gave the "starting signal" for the breeder reactor in 1972. Until last fall Dohnanyi's successors as SPD research ministers would have been able to keep a check on the cost of the breeder. They failed to do so.

11698

CSX 5000/2551



# SPECIAL MEASURES SUCCEEDING IN CARTAGENA AIR POLLUTION BATTLE

Madrid EL PAIS in Spanish 10 Feb 83 p 20

[Article by Isabel Llorens]

[Text] Murcia--A significant bit of information on Cartagena's decrease in air pollution is that while in 1979, 57 days were counted in which the sulphide levels easily surpassed 400 micrograms of emission per cubic meter, in 1982, on only 1 day in the month of July, was that figure surpassed.

This is due to the preventive measures in the emission of gas and solid particles which four of seven industries which pollute the city and the Escombreras valley have put into operation at the time when Cartagena was officially declared a contaminated city and the Ministry of Industry imposed a three-part plan to combat environmental pollution.

However, and coinciding with the first positive results of the battle against air pollution, the Board of Health has published the results of a broad survey on the incidence of contaminants and the frequency of bronchial-pulmonary illnesses among Cartagena children. Dr Elvira Ramos has established the parameters of what has come to be called the "Cartagena syndrome," among the practicing pediatricians in this part of town. The study is based on a broad survey undertaken in various contaminated districts among families with different standards of living.

Elvira Ramos translates her broad inquiry into some very worrisome results when she shows the clear connection between bronchial-pulmonary illnesses and the low standard of living of these patients: a social situation which translates itself into lack of adequate treatment. Within this population it is recognized in the report that a broad sector suffers from "noises and wheezes in the chest, as well as fatigue," which is not possible to evaluate in view of the lack of medical follow-up on the health of these residents. On the other hand the direct relationship between air pollution and the decrease in pulmonary capacity remains perfectly clear: the use of medications and the frequency of medical attention which the people of Cartagena receive relative to illnesses such as asthma and other respiratory ailments is in inverse proportion to the level of their domestic economic situation.

### There Will Be No Relocating

However, none of the seven big industries which actually pollute Cartagena has in mind relocating. "Nor has it ever occurred to us," explains the councilman who understands the situation. In view of the industrial crisis it would be suicide to force any factory to relocate: "As a matter of fact, antipollution measures have been put into effect in only three of the seven enterprises previously noted. Along with the smelter of Penarroya Espanola, Union de Explosivos Rio Tinto and Espanola del Zinc has been added, voluntarily, only Empresa Nacional de Fertilizantes (Enfersa) located in the valley, 7 kilometers from the center of the city where there are so many other plants which pollute and which nobody has so far controlled insofar as their pollution levels are concerned.

There remain outside the air clean-up plan, therefore, industries so contaminating such as the thermal hydroelectric plant and the one called Refineria de Petroleos or Enpetrol, that they alone sometimes pollute the air up to levels of 2,000 micrograms of sulphide per cubic meter, according to calculations of councilman Hernandez. It is certain that nobody knows for sure what the levels of sulphur in Escombreras valley are where 5,000 people live.

From the inception of Royal Decree 1.197 of 1979 which establishes the clean-air plan for Cartagena, the Penarroya company has invested a total of 600 million pesetas in methods and devices which prevent, diminish or disperse the sulphide contaminants which are emitted starting with the stormy north-west wind which dissipates it.

The plant, according to manager Jose Luis Reballo, has prevented the release of sulphur dust thanks to five types of dry filters which are in operation. However, the greatest success from the people's point of view is the 100-meter high smokestack 170 meters above sea level, which emits gases derived from the smelting of lead. The smokestack has cost more than 100 million pesetas, acting in breaking the atmospheric mantle which serves as an umbrella to harbor over the city and returns the smoke on the city. Therefore, the same quantity of sulphide continues to be released which constitutes only 1/10 or 1 percent of all the gases (including steam) which are dispersed by said smokestack.

Thirty percent of the value of the investment demanded by the administration was to be reimbursed by the State, according to the 1972 law on the prevention of environmental pollution. Penarroya, nevertheless, still has not collected the 25 million pesetas which it is owed under this arrangement.

The same thing is happening to Union Explosivo de Rio Tinto, a factory which is practically in the main part of town overlooking the railroad station. According to what was told to EL PAIS by Francisco Doblas, ERT's manager, the company claims from the administration the agreed upon subsidy and in view of the fact that it cost them only 10 percent of the investments made in the first phase, the amount which increased to 91 million pesetas, during the changes referred to in the first and second phases of the imposed plan, the company recently requested reimbursement.

Meanwhile, ERT has definitely dismantled the sulphuric acid ( $\text{SO}_2\text{H}$ ) production plant, and improved the circulation of sulphide and potassium gases and the transport of the fertilizers which it makes in order to eliminate as much as possible contamination by dust. On the other hand, filters for the purification of gases in the calcium phosphate plant, which is still operating on a trial basis since it has not reached its full yield, have been installed. Therefore the pollution from the bicalcium phosphate plant is still significant, and above all spectacular. It is impressive to view in the midst of the urban landscape the thick white plume of smoke from the ERT complex, while the background of the plant maintains a reddish color, although councilman Hernandez might insist that the "shade" has diminished in latter years.

#### Calcium and Zinc

According to Doblado, manager of ERT, calcium levels at present are 200 micrograms per cubic meter, particles which emerge with a great quantity of steam and which produce itching in the noses of the townspeople, although it is not a toxic contamination, according to the municipal interlocutor. The control of solid particle emission is yet to be solved. The municipal government has distributed seven sensors for sulphide in as many districts, but pollution is still uncontrollable in Cartagena. Only the plants themselves know how much dust they expel into the air.

The 0.5 grams per cubic meter per day is then easily surpassed, while the standardized average is 0.3 grams per cubic meter. Chlorides, sulphates and phosphates, together with particles of aluminum, cadmium, zinc, and lead show sedimentation levels which reach 7.6 and 0.9 percent.

But the companies which continue to pollute freely constitute the main worry of the authorities who know the limitations of the present methods.

9673

CSO: 5000/2547

# INDUSTRIAL WASTE THREAT TO BURSA AGRICULTURE

Istanbul DUNYA in Turkish 28 Feb 83 p 4

[Text] BURSA (DUNYA) - The mayor of Bursa, Zekai Gumusdis, said that industrial wastes have become a threat to agriculture in Bursa and its surroundings.

In his written statement Mayor Gumusdis drew attention to the fact that if no solution was found to the sewage and industrial wastes carried by the Susurlu, Kemalpaşa and Nilüfer creeks, the Bursa, Mustafakemalpaşa and Karacabey plains could be lost and he pointed out that pollution in those streams had reached frightening levels.

Bursa mayor Gumusdis, noting that according to manufacturing industry surveys there were 1510 firms offering 10 types of employment opportunities in Bursa, pointed out that there were 101 big industrial enterprises outside of the Bursa Central District for organized industry and said: "Together with those, in our organized industrial zone 75 of our installations are devoted to agriculture. 35 percent of them are branches of the textile industry, 30 percent of them automotive main and subsidiary industries, 20 percent of them metal and machine industries and 10 percent are branches of various other industries. Furthermore, on the Gemlik district shores including the giant azote and artificial silk installations, there are 12 and in Orhangazi there are 6 giant industrial installations belonging to enterprises such as Asil Celik and Doktas.

Together with the industrial installations in Bursa which empty their wastes into the Nilüfer creek, the Gemlik, Orhangazi, Mustafakemalpaşa and Karacabey installations which empty their wastes into the Karsak stream and directly into the Sea of Marmara constitute the main sources of pollution in that zone. Furthermore, the waste created by the Susurluk Sugar Factory and by the Seka [Turkish Cellulose and Paper Factories] reaches the sea in Karacabey Bogazkoy. The Tuncbilek, Tavşanlı, Susurluk and Emet mines contribute greatly to environmental pollution in Bursa. Beside the important factors cited, there are countless olive oil and other workshops which add to this pollution. The whole area is under pressure from this increasing pollution. The main pressure, however, is on Bursa and on agriculture in that zone, because streams that have been turned by industrial waste into foci of pollution flow through the Bursa, Karacabey and Mustafakemalpaşa plains. Unless precautions are taken this situation will cause the loss of these three fertile plains. It is essential to find a solution to the pollution threatening agriculture.

Mayor Gumusdis also gave the information that, in addition to industrial waste, together with the increased population in the area, sewage too had a growing share in contributing to pollution, and he continued as follows: "Bursa's urban population has reached 650,000. Together with the population of the surrounding areas this figure reaches 800,000. Furthermore, the populations of Gemlik and Mudanya, which are tourist zones reach the 100 thousands in the summer. In a zone where close to 1 million people are living, sewage reaches the sea through streams. Sewage and industrial wastes will become a threat to the Sea of Marmara in the near future.

#### Observation Stations Must be Established to Determine Pollution Levels

Bursa mayor Zekai Gumusdis reminded that studies about the influence of mineral residues on Bursa rivers were carried out by the DSI [State Hydraulic Affairs] District Directorate with films and photographs, and said that work on the question of the pollution of the sea was not done on a similar level and ended his statement as follows: "neither the observations of the District Directorate of Water Products nor those of the sanitary institutions are adequate. Observations and counts which are carried out from time to time have not been anything more than checks. The samples which are collected haphazardly are inconsistent and provide far from sufficient information. I believe that observation stations which will take, regularly and carefully, fixed quantities of samples should be established."

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